2008 600 RR / IQ RACER SNOWMOBILE SERVICE MANUAL

FOREWORD

This service manual is designed primarily for use by certified Polaris Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

Comments or suggestions about this manual may be directed to: Service Publications Dept. @ Polaris Sales Inc. 2100 Hwy 55 Medina Minnesota 55340.

2008 600 RR / IQ Racer Snowmobile Service Manual PN 9921088

© Copyright 2007 Polaris Sales Inc. All information contained within this publication is based on the latest product information at the time of publication. Due to constant improvements in the design and quality of production components, some minor discrepancies may result between the actual vehicle and the information presented in this publication. Depictions and/or procedures in this publication are intended for reference use only. No liability can be accepted for omissions or inaccuracies. Any reprinting or reuse of the depictions and/or procedures contained within, whether whole or in part, is expressly prohibited. Printed in U.S.A.

UNDERSTANDING MANUAL SAFETY LABELS AND DIRECTIONS

Throughout this manual, important information is brought to your attention by the following symbols:

⚠ WARNING

SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.

⚠ CAUTION

SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

CAUTION

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

NOTE:

NOTE provides key information by clarifying instructions.

IMPORTANT:

IMPORTANT provides key reminders during disassembly, assembly and inspection of components.

= **In. / mm.**

MEASUREMENT provides a key for a determined measurement specification.

= **T**

TORQUE provides a key for a required torque value.

TRADEMARKS

POLARIS ACKNOWLEDGES THE FOLLOWING PRODUCTS MENTIONED IN THIS MANUAL:

Loctite, Registered Trademark of the Loctite Corporation
Nyogel, Trademark of Wm. F. Nye Co.
Fluke, Registered Trademark of John Fluke Mfg. Co.
Mity-Vac, Registered Trademark of Neward Enterprises, Inc.
Torx, Registered Trademark of Textron
M-10, Registered Trademark of FAST Inc.
WD-40, Registered Trademark of WD-40 Company
Rapid Reaction Driven Clutch, Registered Trademark of Team Industries Inc.
VM and TM Carburetors, Registered Trademarks of Mikuni American Corporation

W I N N I N G P E R F O R M A N C E

POLARIS®

2008 600 RR / IQ Racer
Service Manual Chapters

Model Specifications 1
General Information 2
Maintenance 3
Fuel Systems 4
Engine Systems 5
Final Drive and Brake Systems 6
PVT System 7
Suspension and Steering 8
Shocks 9
Chassis 10
Electrical Systems 11
Wiring Schematics 12

CHAPTER 1
Model Specifications

1

SPECIFICATIONS 1.2
2008 600 IQ RR 1.2
2008 600 IQ RACER 1.4

SPECIFICATIONS

2008 600 RR

Model Number: S08MX6FS / S08MX6FE

Engine

Engine Type	Liberty Liquid-Cooled / Case Reed Induction
Model Number	S3649 - 6044 - PU6F
Displacement / # Cylinders	599cc / 2
Bore (inches/mm)	3.04 / 77.25
Stroke (inches/mm)	2.52 / 64
Piston to Cylinder Clearance (inches/mm)	.004 - .006 / .105 - .159
Installed Ring Gap (inches / mm)	.014 - .020 / .036 - .508
Operating RPM ±200	8100
Idle RPM	1500
Engagement RPM ±200	4700
Exhaust Valve Spring	Pink

Carburetor Settings

Type	Mikuni TM38
Main Jet	450
Pilot Jet	35
Jet Needle/Clip position	9DGN6-57 / 3
Needle Jet	P-8
Throttle Gap Under Cutaway (in/mm)	2.5mm
Cutaway	2.5
Valve Seat	1.5
Starter Jet	145
Pilot Air Jet	.6
Fuel screw (Turns Out)	1
Recommended Fuel Octane (R+M/2)	91 (Non-Oxygenated)

Carburetor Jetting

Altitude Meters (feet)	Ambient Temperature							
	< -25°F/<-35°C	-30°F to -10°F/-34°C to -23°C	-15°F to +5°F/-26°C to -15°C	0°F to +20°F/-18°C to -7°C	+15°F to +35°F/-9°C to +2°C	+30°F to +50°F/-1°C to +10°C	+45°F to +65°F/+7°C to +18°C	>+60°F/>+16°C
0-600 (0-2000)	470 #4	460 #4	450 #3	430 #3	420 #3	400 #2	390 #2	370 #1
600-1200 (2000-4000)	450 #4	440 #3	420 #3	410 #2	400 #2	380 #2	360 #1	350 #1
1200-1800 (4000-6000)	420 #3	410 #3	400 #2	380 #2	370 #2	360 #1	340 #1	330 #1
1800-2400 (6000-8000)	390 #3	380 #2	370 #2	360 #2	340 #1	330 #1	320 #1	300 #1
2400-3000 (8000-10,000)	360 #2	360 #2	340 #2	330 #1	320 #1	300 #1	290 #1	270 #1
3000-3700 (10,000-12,000)	340 #2	330 #2	320 #2	300 #1	290 #1	270 #1	260 #1	250 #1

When using non oxygenated fuel with a RON greater than 93, decrease the main jet number in the above chart by 10 and raise the E-clip one position. If the chart recommends clip #1, install washer on top when using RON 93.

Clutch Settings

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	10-58	Almond/ Red (7041988)	Black (7043063)	60 / 42 - .36 (LWT)	22:39 - 74
600-1200 (2000-4000)	10-56				
1200-1800 (4000-6000)	10-54				
1800-2400 (6000-8000)	10				21:41 - 74
2400-3000 (8000-10,000)	10M-5				
3000-3600 (10,000-12,000)	10M-B				

Drive Clutch Bolt Torque: 50 lb.ft. (68 Nm)

General

Width (in/cm)	48 / 121.9
Length (in/cm)	110 / 279.4
Height (in/cm)	44 / 111.8
Estimated Dry Weight (lb/kg)	475 / 215.7
Fuel (Gallons / Liters)	9 / 34.1
Oil (Quarts / Liters)	2.5 / 2.4
Cooling System Capacity (Quarts / Liters)	TBD
Brake Fluid	DOT 4
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm) Ride Out (inches / mm)	 3211114 1.46 / 3.72 26° 45.20 / 114.8 10.625 / 27 .10 / 2.5
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 7.92 22 39 74 Polaris Synthetic (80W) 9 / 266.2 Perc

Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total)	 13.5 - 14.5 Vdc 280
Ignition Timing	26° @3500 RPM (TPS Un-plugged)
Spark Plug Gap in.(mm)	.027 (.70)
Spark Plug	Champion RN57YCC

Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	121 (307)
Lug Height - Inches (cm)	1.25 (3.175)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	1-1/4" – 1-1/2" (3.2 - 3.8cm)

Front Suspension

Suspension Type	IQ Race
Shocks	Walker Evans IFP /16 Position Compression Adjustable / Remote Reservoir
IFS Spring Rate lbs./in.	130
Spring Installed Length Inches (cm)	12.00" (30.5)
Front Vertical Travel Inches (cm)	11.5 (29.1)
Suspension Setup Width Inches (cm)	Not Adjustable
Camber Inches (cm)	Not Adjustable
Toe Out Inches (cm)	0 - 1/8" (0 - 0.31)

Rear Suspension

Suspension Type	IQ Race
Front Track Shock (FTS)	Walker Evans Air
FTS Shock Oil Volume	50cc
FTS Nitrogen Pressure	170 psi
Rear Track Shock (RTS)	Walker Evans IFP / 16 Position Compression Adjustable / Remote Reservoir
Torsion Spring Diameter Tail Angle	.347" Square 77°
Rear Travel Inches (cm)	13.9" (35.3)

2008 600 IQ Racer

Model Number: S08MX6JS / S08MX6JE

Engine

Engine Type	Liberty Liquid-Cooled / Case Reed Induction
Model Number	S3577 - 6044 - PU6J
Displacement / # Cylinders	599cc / 2
Bore (inches/mm)	2.90 / 73.8
Stroke (inches/mm)	2.75 / 70
Piston to Cylinder Clearance (inches/mm)	.0034 - .005 / .088 - .129
Installed Ring Gap (inches / mm)	.014 - .022 / .036 - .56
Operating RPM ±200	8250
Idle RPM	1500
Engagement RPM ±200	5500
Exhaust Valve Spring	Purple

Carburetor Settings

Type	Mikuni TM40
Main Jet	460
Pilot Jet	55
Jet Needle/Clip position	9FH4-57 / 2
Needle Jet	Q-0
Throttle Gap (Under Cutaway) (in/mm)	2.0
Cutaway	1.5
Valve Seat	1.8
Starter Jet	145
Pilot Air Jet	.7
Fuel screw (Turns Out)	2.5
Recommended Fuel Octane (R+M/2)	92 Non-Oxygenated

Carburetor Jetting

Altitude Meters (feet)	Ambient Temperature							
	< -25°F/<-35°C	-30°F to -10°F/-34°C to -23°C	-15°F to +5°F/-26°C to -15°C	0°F to +20°F/-18°C to -7°C	+15°F to +35°F/-9°C to +2°C	+30°F to +50°F/-1°C to +10°C	+45°F to +65°F/+7°C to +18°C	>+60°F/>+16°C
0-600 (0-2000)	520 #4	500 #3	490 #3	480 #2	460 #2	450 #2	430 #1	420 #.5
600-1200 (2000-4000)	490 #3	480 #3	460 #2	450 #2	430 #2	420 #2	400 #1	380 #.5
1200-1800 (4000-6000)	460 #3	450 #3	430 #2	420 #2	400 #2	390 #1	370 #1	360 #.5
1800-2400 (6000-8000)	430 #3	420 #2	400 #2	390 #2	370 #1	360 #1	340 #.5	330 #.5
2400-3000 (8000-10,000)	400 #3	390 #2	370 #2	360 #1	340 #1	330 #1	310 #.5	300 #.5
3000-3700 (10,000-12,000)	370 #2	360 #2	340 #2	330 #1	310 #1	300 #.5	280 #.5	270 #.5

NOTE: Needle position (#.5) = plastic washer installed on top of needle E-clip.

Clutch Settings

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-900 (0-3000)	10-58	Almond/Red (7041988)	160 / 280 (Black) (7043252)	70 / 44 - .46 66 / 44 - .46	19:45 - 76
900-1800 (3000-6000)	10-56				
1800-2700 (6000-9000)	10-54				
2700-3700 (9000-12,000)	10-AL				
Drive Clutch Bolt Torque: 50 lb.ft. (68 Nm)					

WINNING PERFORMANCE POLARIS

General

Width (in/cm)	48 / 122
Length (in/cm)	110 / 279
Height (in/cm)	44 / 11.8
Estimated Dry Weight (lb/kg)	TBD
Fuel (Gallons / Liters)	4 (15.14)
Oil (Quarts / Liters)	Pre-Mix (32:1)
Cooling System Capacity (Quarts / Liters)	4 / 3.8
Brake Fluid	DOT 4
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm) Ride Out (inches / mm)	 3211114 1.46 / 3.72 26° 45.20 / 114.8 10.625 / 27 .10 / 2.5
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml)	 7.92 19 45 76 Polaris Synthetic (80W) 9 / 266.2

Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total)	 13.5 - 14.5 Vdc 220
Ignition Timing	6° @ 2000 RPM
Spark Plug Gap in.(mm)	.027 (.70)
Spark Plug	Champion RN57YCC
Timing Box Setting	Position G

Track

Width - Inches (cm)	14.75 (37.5)
Length - Inches (cm)	121 (307.3)
Lug Height - Inches (cm)	1.75 (4.4)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	1-1/4″ – 1-1/2″ (3.2 - 3.8cm)

Front Suspension

Suspension Type	IQ Race
Shocks	Walker Evans IFP / 16 Position Compression Adjustable / Remote Reservoir / Race Valving
IFS Spring Rate lbs./in.	150
Spring Installed Length Inches (cm)	12.00″ (30.5)
Front Vertical Travel Inches (cm)	11.5″ (29.1)
Suspension Setup Width Inches (cm)	Not Adjustable
Camber Inches (cm)	Not Adjustable
Toe Out Inches (cm)	0 - 1/8″ (0 - 0.31)

Rear Suspension

Suspension Type	IQ Race
Front Track Shock (FTS)	Walker Evans Air
FTS Oil Volume	50cc
FTS Nitrogen Pressure	170 psi
Rear Track Shock (RTS)	Walker Evans IFP / 16 Position Compression Adjustable / Piggy Back Reservoir / Race Valving
Torsion Spring Diameter Tail Angle	.359″ 77°
Rear Travel Inches (cm)	13.9″ (35.3)

NOTES

CHAPTER 2
General Information

2

RACING NOTES 2.2
POLARIS RACING DEPARTMENT 2.2
2008 600 IQ RACER MODEL 2.2
OVERVIEW. 2.2
BREAK-IN. 2.2
2008 600 RR MODEL 2.2
OVERVIEW. 2.2
SNOWMOBILE NUMBER DESIGNATIONS 2.3
MODEL NUMBER DESIGNATION. 2.3
VEHICLE IDENTIFICATION NUMBER (VIN) 2.4
TUNNEL DECAL. 2.4
VIN NUMBER DESIGNATION 2.4
PUBLICATION PART NUMBERS 2.4
2008 PUBLICATIONS. 2.4
ENGINE DATA FORMULAS 2.5
COMPRESSION RATIO. 2.5
COMPRESSION RATIO EXAMPLE. 2.6
HEAD CC REMOVAL EXAMPLE 2.6
PORT OPENING DURATION. 2.6
TORQUE CONVERSION 2.7
US TO METRIC 2.7
GENERAL REFERENCE. 2.8
STANDARD BOLT TORQUE SPECIFICATION. 2.8
FUEL / OIL PREMIX RATIOS. 2.8
GASOLINE VOLATILITY 2.8
SAE TAP DRILL SIZES 2.9
METRIC TAP DRILL SIZES 2.9
DECIMAL EQUIVALENTS 2.9
MEASUREMENT CONVERSION CHART 2.10
PISTON WASH / SPARK PLUG READING 2.10
SERVICE PRECAUTIONS 2.11
GENERAL PRECAUTIONS 2.11

RACING NOTES

Welcome to the 2007-2008 Polaris Racing season! Thank you for selecting the 2008 Polaris 600 IQ Racer snowmobile as your winning vehicle!

The enclosed technical information, which is based on our past experience, should be reviewed by your team for machine preparation. Do not feel that these suggestions are a must, but use them as a starting point.

The section index enables the user to quickly locate the component unit section desired. A table of contents is placed at the beginning of each chapter to aid the user in locating general areas of information. Keep this manual available for reference.

In order to provide you with the best support possible, Polaris racing, engineering, and testing departments must have timely and accurate data from the field. The weekly racing report form is a valuable source of this data. As a part of the Polaris team, your input is highly valued and never ignored.

At Polaris, we are committed to your racing effort. We wish you the best of luck in the season ahead!

Please visit our web site for updated information throughout the racing season.

http://www.polarisindustries.com/en-us/snowmobiles/racing

Polaris Racing Department

POLARIS RACING

10303 Calumet Ave.
Suite # 1
Rothschild, WI 54474
Phone: (715) 355-5157
Contact: Tom Rager Jr. EXT 11
Bill Rader EXT 12
Fax: (715) 355-8797

PARTS SUPPORT
Brad Seavers
Phone: (715) 355-3008
Fax: (715) 355-8797

SOUTHSIDE RACE SUPPORT
Contact: Bruce Gaspardi
546 Curran Hwy.
North Adams, MA 01247
PHONE: (413) 664-7111
WEB: www.southsidesales.com

2008 600 IQ RACER MODEL

Overview

The 2008 600 IQ Racer model has been designed and tested to endure the toughest of all races. Many hours have gone into determining the overall “best” manufacturing setup based on average rider weight and typical riding environment. All 2008 600 IQ Racer snowmobiles are setup as follows:

- Stock suspension and gearing is setup for a 170 lb. (77.18 kg) rider.
- Carburetor and clutching is setup for operation at 0 - 3,000 feet (0 - 900 meters).

Break-In

1. Always break-in any new part for 50-75 miles before using it for racing.
2. Clutch springs and belts need to be broken in to reach peak performance.
3. Always use 92 octane fuel or the required racing fuel based on the level of engine and ignition modifications.
4. Always use Polaris Racing Oil. Pre mix 20:1 during the break-in period, then 32:1 for normal operation.
5. Always break-in a new or rebuilt engine to ensure durability.

2008 600 RR MODEL

Overview

The 2008 600 RR snowmobile shares many of the same race-proven features found on the 2008 600 IQ racer model. Some of the most significant differences are:

- 600 RR engine bore x stroke = 77.25 x 64mm
- 600 Racer engine bore x stroke = 73 x 70mm
- 600 Racer requires 92 octane fuel. 600 RR calibrated for 91 (oxygenated) fuel.
- 600 RR front suspension is narrower than Racer (Trail Legal).
- 600 RR features less aggressive front and rear suspension shock valve configurations and rear torsion springs.
- 600 RR features PERC. 600 Racer uses Dragon pipe heater ignition system.
- 600 RR uses larger, 9 gallon fuel tank.
- 600 RR uses TM38 carburetors. Racer uses TM40s.
- 600 RR utilizes oil injection. 600 Racer requires pre-mixed fuel.

SNOWMOBILE NUMBER DESIGNATIONS

Model Number Designation

Example: S08MX6FS

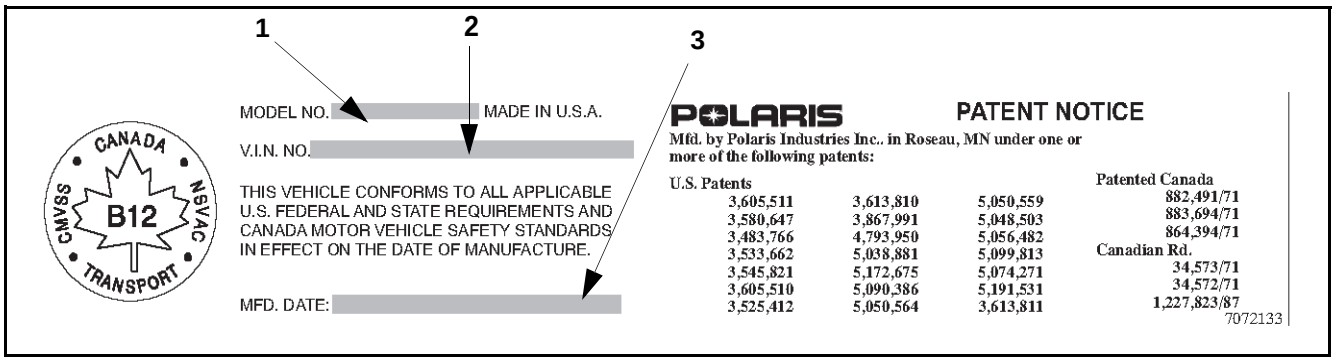
GROUP	MODEL YEAR	MODEL LINE	MODEL TYPE	ENGINE MODIFIER		VIN IDENTIFIER	OPTION IDENTIFIER
1st digit	2/3rd digit	4th digit	5th digit	6th digit*	7th digit*	8th digit	9th digit**
S	08	M	X	6	F	S	
S=Snow	08 = 2008 09 = 2009 10 = 2010 11 = 2011 12 = 2012 13 = 2013 14 = 2014 15 = 2015	M=Race IQ N=Edge P= IQ S=GenII W=Mini Indy	B = Basic D = LX G = 155 RMK H = 163 RMK J = 136 RMK K = 144 RMK M = 155 STD. N = 163 STD. P = Performance R = Switchback S = Switchback Prem. T = Touring U = Utility X = Race Y = Touring LTD.	1A=121 F/C OHV 4 Cycle Fuji 3A=340 F/C Piston Port 4B=488 L/C Piston Port 5B=544 F/C Cylinder Reed 6F=600 EV L/C Case Reed 6H=600 EV L/C Case Reed CFI 6J = 600 EV L/C Case Reed Race 7E=750 Four Stroke 7F=750 Four Stroke Turbo 7J=700 EV L/C Case Reed CFI 8E = 795 EV L/C Case Reed CFI		E=Europe M=Military R=Rolling Chassis S=Standard	Option

*=digits that would transfer to 17 digit VIN and are used in digits 4-8 respectively
**=9th digit will be used on color/featured versions of models (not including the base)
First 3 digits and 9th digit are sued in model number only. They are not used with the 17 digit VIN.

VEHICLE IDENTIFICATION NUMBER (VIN)

Tunnel Decal

The Tunnel Decal has the Model Number (1), V.I.N. Number (2), and the Manufactured Date (3).These numbers should be referred to in any correspondence regarding warranty, service or replacement parts.The machine model and V.I.N. number identification decal is located on the right front side of the tunnel. The V.I.N (2) number is permanently stamped into the tunnel. The model number is embossed on the decal.



VIN Number Designation

World Mfg. ID			Vehicle Descriptors						Vehicle Identifiers							
			Body Style	Type	Engine Size	Engine Modifier	Series	Check Digit	Model Year	Mfg. Location	Individual Serial No.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
S	N	1	S	B	5	B	S	0	2	2	0	0	0	0	0	0

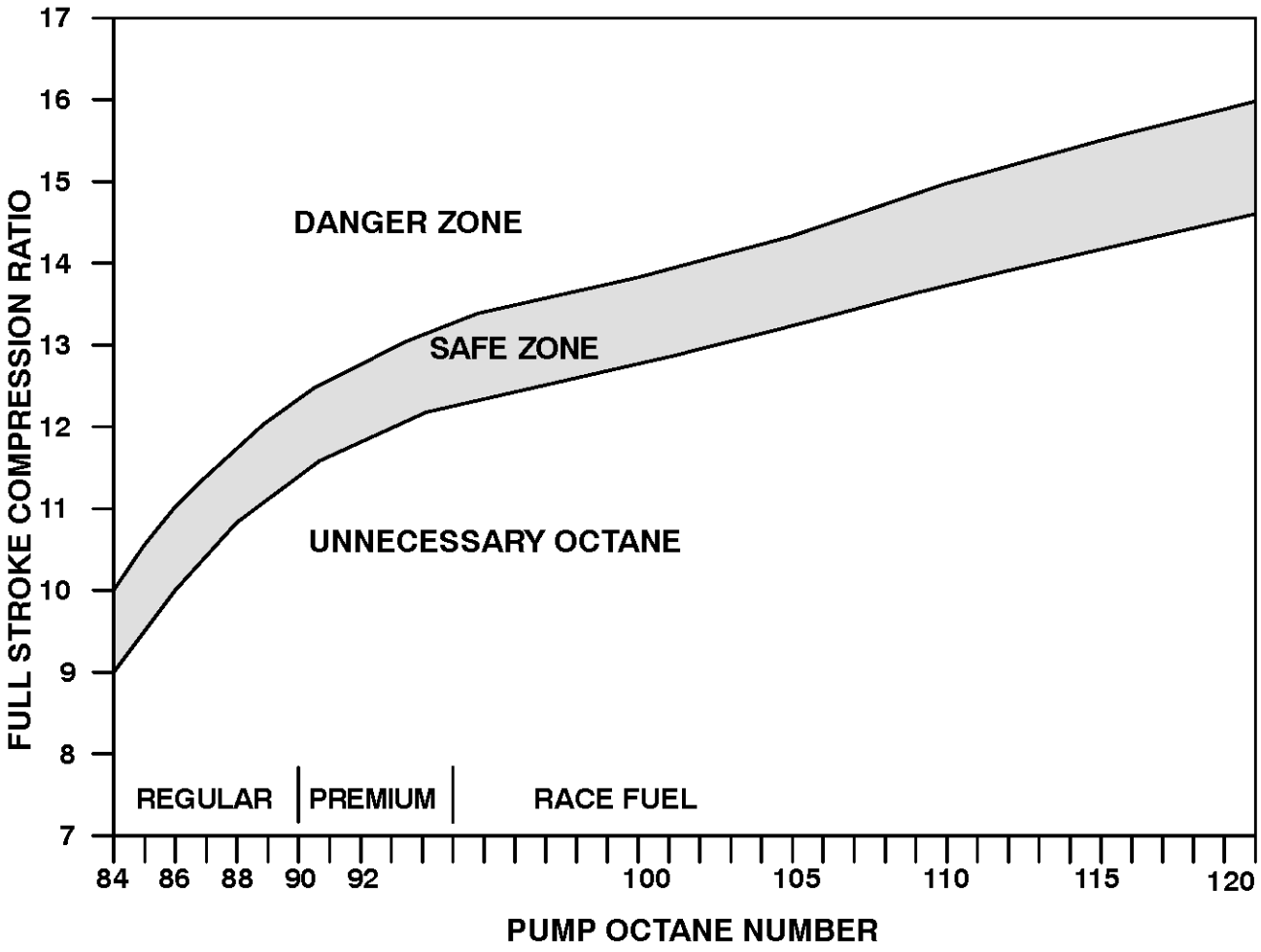
PUBLICATION PART NUMBERS

2008 Publications

MODEL	OWNER'S MANUAL	SUPPLEMENT	PARTS BOOK
600 RR	9921089	9921514	9921389 / Online at: www.polarisindustries.com
600 Racer		N/A	9921090/ Online at: www.polarisindustries.com

ENGINE DATA FORMULAS

Compression Ratio



$$R = \frac{(IHV + DISP)}{IHV}$$

$$I = \frac{S}{(DISP \times 25.4)}$$

$$DISP = \frac{(PI \times B^2 \times S)}{4}$$

IHV= INSTALLED HEAD VOLUME (cc)
DISP= CYLINDER DISPLACEMENT (cc)
R= COMPRESSION RATIO
S= FULL ENGINE STROKE (cm)
I= INCHES PER cc OF IHV
B= CYLINDER BORE (cm)
PI= 3.1416

Compression Ratio Example

Bore = 6.5cm

Stroke = 6.0 cm

IHV = 17.1cc

Displacement = 3.1416 (PI) x 42.25 (Bore squared) x 6.0 (stroke) / 4 = 199.098cc

Displacement = 199.098cc

R= 17.1 + 199.098 / 17.1 = 12.643 Full Stroke Compression Ratio

To calculate the Effective Compression Ratio, substitute the exhaust port height for the stroke in the formulas above:

Exhaust = 2.95cm (exhaust port height is 29.5mm)

Effective Displacement = 3.1416 (PI) x 42.25 (bore squared) x 2.95 (exhaust port height cm) / 4 = 97.89cc

Effective Displacement = 97.89cc

Effective Compression Ratio = 17.1 (IHV cc) + 97.89 (Effective Displacement cc) / 17.1 (IHV cc) = 6.725

Effective Compression Ratio = 6.725

In order to increase the Full Stroke Compression Ratio to 13.6, how much material do you need to remove from the cylinder head?

You know that: R = IHV + Displacement / IHV, and you want to find out IHV.

Displacement = 199.098cc, and we want R to = 13.6, so then IHV (desired) = Displacement (199.098cc) / R (13.6) - 1 = (12.6)

IHV (desired) = 15.801cc desired IHV to have 13.6:1 Full Compression Ratio

Head cc Removal Example

The total number of cc's to remove from the head = Old IHV (17.1) - Desired IHV (15.801) = 1.299cc's

Removed cc's = 1.299cc's

I = Stroke (6.0cm) / (Displacement (199.098) x 2.54

I= 0.01186 inches

To find out how much to machine off, multiply the number of cc's you need to remove by the number of inches to remove per cc.

Thickness to remove = I (0.01186) x 1.299cc = 0.015"

Port Opening Duration

Port open = 81.5° This indicates the degrees after TDC that the exhaust port opens, and also the degrees before TDC that the port closes.

Duration closed = 2 x 81.5 (port open)

Duration closed = 163°

Total Duration = 360°

Duration Open = Total Duration (360) - Duration Closed (163)

360-163=197

Duration Open = 197°

Percent Open = Duration Open (197) / Total Duration (360) x 100

197/360 = 0.54722 x 100 = 54.722

Percent Open = 54.722

TORQUE CONVERSION

US to Metric

Ft.Lb. - Nm

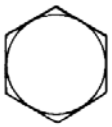
FT.LB	NM	FT.LB	NM
1	1.4	46	62.4
2	2.7	47	63.7
3	4.1	48	65.1
4	5.4	49	66.4
5	6.8	50	67.8
6	8.1	51	69.2
7	9.5	52	70.5
8	10.8	53	71.9
9	12.2	54	73.2
10	13.6	55	74.6
11	14.9	56	75.9
12	16.3	57	77.3
13	17.6	58	78.6
14	19.0	59	80.0
15	20.3	60	81.4
16	21.7	61	82.7
17	23.1	62	84.1
18	24.4	63	85.4
19	25.8	64	86.8
20	27.1	65	88.1
21	28.5	66	89.5
22	29.8	67	90.9
23	31.2	68	92.2
24	32.5	69	93.6
25	33.9	70	94.9
26	35.3	71	96.3
27	36.6	72	97.6
28	38.0	73	99.0
29	39.3	74	100.3
30	40.7	75	101.7
31	42.0	76	103.1
32	43.4	77	104.4
33	44.7	78	105.8
34	46.1	79	107.1
35	47.5	80	108.5
36	48.8	81	109.8
37	50.2	82	111.2
38	51.5	83	112.5
39	52.9	84	113.9
40	54.2	85	115.3
41	55.6	86	116.6
42	57.0	87	118.0
43	58.3	88	119.3
44	59.7	89	120.7
45	61.0	90	122.0

Ft.Lb. - Nm

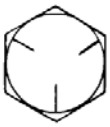
FT.LB	NM	FT.LB	NM
91	123.4	96	130.2
92	124.8	97	131.5
93	126.1	98	132.9
94	127.5	99	134.2
95	128.8	100	135.6

GENERAL REFERENCE

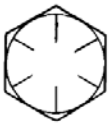
Standard Bolt Torque Specification



Grade 2



Grade 5



Grade 8

Bolt Size	Threads/In	Grade 2 ft-lb(N-m)	Grade 5 ft-lb(N-m)	Grade 8 ft-lb(N-m)
1/4	20	5 (7)	8 (11)	12 (16)
1/4	28	6 (8)	10 (14)	14 (19)
5/16	18	11 (15)	17 (23)	25 (35)
5/16	24	12 (16)	19 (26)	29 (40)
3/8	16	20 (27)	30 (40)	45 (62)
3/8	24	23 (32)	35 (48)	50 (69)
7/16	14	30 (40)	50 (69)	70 (97)
7/16	20	35 (48)	55 (76)	80 (110)
1/2	13	50 (69)	75 (104)	110 (152)
1/2	20	55 (76)	90 (124)	120 (166)
ft-lb X 1.356 = N-m N-m X.7376 = ft-lb				

Fuel / Oil Premix Ratios

Fuel (Gallons)	**20:1** Ratio (Ounces of Oil)	**32:1** Ratio (Ounces of Oil)
1	6.4	4
5	32	20
10	64	40

Formula:

- 1 Gallon = 128 Ounces
- 128 ÷ (Desired Ratio) = Ounces of oil for every 1 gallon of fuel.
- 128 ÷ 20 (20:1 Ratio) = 6.4 ounces of oil for every 1 gallon of fuel.

Always mix ratio in 5 gallon increments.

Gasoline Volatility

Maximum Reid Vapor		Ambient Air Temp Range	
CLASS	PRESSURE	LOW	HIGH
A	7.0 psi (0.5 bar)	60°F (16°C)	110°F+ (43°C+)
B	9.0 psi (0.6 bar)	50°F (10°C)	110°F (43°C)
C	10.5psi (0.7 bar)	40°F (4°C)	97°F (36°C)
D	12.0psi (0.8 bar)	30°F (-1°C)	85°F (29°C)
E	13.5psi (0.9 bar)	20°F (-7°C)	69°F (21°C)
Add 2.45°F for each 1000 ft (305m) above sea level			

When gasoline is blended, it is given a Reid Vapor Pressure (RVP) number which reflects its ability to vaporize or mix with air at a given temperature range. Gasoline vapor pressure is measured by putting a sample of fuel inside a closed container and applying a specified amount of heat to the container for a certain amount of time. RVP will vary from about 7.0 PSI during the summer to approximately 13.5 PSI during the colder months. Service stations selling a large volume of fuel will normally have the correct blend to work well at all times throughout the year in their local area.

When the weather is very cold, gasoline must be able to vaporize very quickly in order for an engine to start and warm up properly. If summer blend fuel is being used in the winter, little or no vaporization will occur. Droplets will form causing flooding and very hard starting.

If winter blend fuel is being used during the summer months, it may cause vapor lock (boiling fuel) inside the fuel lines, fuel pump, or carburetor. This will cause warm engine drive ability problems and hard starting when warm.

SAE Tap Drill Sizes

Thread Size	Drill Size	Thread Size	Drill Size
#0-80	3/64	1/2-13	27/64
#1-64	53	1/2-20	29/64
#1-72	53	9/16-12	31/64
#2-56	51	9/16-18	33/64
#2-64	50	5/8-11	17/32
#3-48	5/64	5/8-18	37/64
#3-56	45	3/4-10	21/32
#4-40	43	3/4-16	11/16
#4-48	42	7/8-9	49/64
#5-40	38	7/8-14	13/16
#5-44	37	1-8	7/8
#6-32	36	1-12	59/64
#6-40	33	1 1/8-7	63/64
#8-32	29	1 1/8-12	1 3/64
#8-36	29	1 1/4-7	1 7/64
#10-24	24	1 1/4-12	1 11/64
#10-32	21	1 1/2-6	1 11/32
#12-24	17	1 1/2-12	1 27/64
#12-28	4.6mm	1 3/4-5	1 9/16
1/4-20	7	1 3/4-12	1 43/64
1/4-28	3	2-4 1/2	1 25/32
5/16-18	F	2-12	1 59/64
5/16-24	I	2 1/4-4 1/2	2 1/32
3/8-16	O	2 1/2-4	2 1/4
3/8-24	Q	2 3/4-4	2 1/2
7/16-14	U	3-4	2 3/4
7/16-20	25/64		

Metric Tap Drill Sizes

Tap Size	Drill Size	Decimal Equivalent	Nearest Fraction
3x.50	#39	0.0995	3/32
3x.60	3/32	0.0937	3/32
4x.70	#30	0.1285	1/8
4x.75	1/8	0.125	1/8
5x.80	#19	0.166	11/64
5x.90	#20	0.161	5/32
6x1.00	#9	0.196	13/64
7x1.00	16/64	0.234	15/64
8x1.00	J	0.277	9/32
8x1.25	17/64	0.265	17/64
9x1.00	5/16	0.3125	5/16
9x1.25	5/16	0.3125	5/16
10x1.25	11/32	0.3437	11/32
10x1.50	R	0.339	11/32
11x1.50	3/8	0.375	3/8
12x1.50	13/32	0.406	13/32
12x1.75	13/32	0.406	13/32

Decimal Equivalents

1/64 ---------- .0156
1/32 ---------- .0312 -- 1 mm= .0394"
3/64 ---------- .0469
1/16 ---------- .0625
5/64 ---------- .0781 -- 2 mm = .0787"
3/32 ---------- .0938
7/64 ---------- .1094 -- 3 mm =.1181"
1/8 ---- .1250
9/64 ---------- .1406
5/32 ---------- .1563 -- 4 mm = .1575"
11/64 ---------- .1719
3/16 ---------- .1875 -- 5mm= .1969"
13/64 ---------- .2031
7/32 ---------- .2188
15/64 ---------- .2344 -- 6 mm = .2362"
1/4 ---- .25
17/64 ---------- .2656 -- 7 mm = .2756"
9/32 ---------- .2813
19/64 ---------- .2969
5/16 ---------- .3125 -- 8mm= .3150"
21/64 ---------- .3281
11/32 ---------- .3438 -- 9 mm = .3543"
23/64 ---------- .3594
3/8 ---- .375
25/64 ---------- .3906 -- 10 mm = .3937"
13/32 ---------- .4063
27/64 ---------- .4219 -- 11 mm =.4331"
7/16 ---------- .4375
29/64 ---------- .4531
15/32 ---------- .4688 -- 12 mm = .4724"
31/64 ---------- .4844
1/2 ---- .5 ---------- 13mm = .5118"
33/64 ---------- .5156
17/32 ---------- .5313
35/64 ---------- .5469 -- 14 mm = .5512"
9/16 ---------- .5625
37/64 ---------- .5781 -- 15 mm = .5906"
19/32 ---------- .5938
39/64 ---------- .6094
5/8 ---- .625 ---------- 16mm=. 6299"
41/64 ---------- .6406
21/32 ---------- .6563 -- 17 mm =.6693"
43/64 ---------- .6719
11/16 ---------- .6875
45/64 ---------- .7031 -- 18 mm = .7087"
23/32 ---------- .7188
47/64 ---------- .7344 -- 19 mm = .7480"
3/4 ---- .75
49/64 ---------- .7656
25/32 ---------- .7813 -- 20 mm = .7874"
51/64 ---------- .7969
13/16 ---------- .8125 -- 21 mm =.8268"
53/64 ---------- .8281
27/32 ---------- .8438
55/64 ---------- .8594 -- 22 mm = .8661"
7/8 ---- .875
57/64 ---------- .8906 -- 23 mm = .9055"
29/32 ---------- .9063
59/64 ---------- .9219
15/16 ---------- .9375 -- 24 mm = .9449"
61/64 ---------- .9531
31/32 ---------- .9688 -- 25 mm = .9843"
63/64 ---------- .9844
1 ------ 1.0

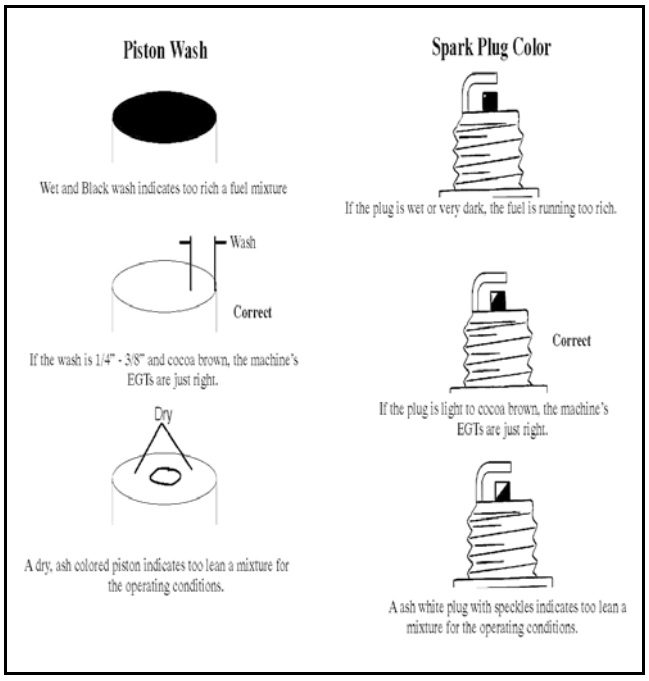
Measurement Conversion Chart

UNIT OF MEASURE	MULTIPLIED BY	CONVERTS TO
ft-lb	x 12	= in-lb
in-lb	x.0833	= ft-lb
ft-lb	x 1.356	= N-m
in-lb	x.0115	= kg-m
N-m	x.7376	= ft-lb
kg-m	x 7.233	= ft-lb
kg-m	x 86.796	= in-lb
kg-m	x 10	= N-m
in	x 25.4	= mm
mm	x.03937	= in
in	x 2.54	= cm
mile	x 1.6	= km
km	x.6214	= mile
Ounces (oz)	x 28.35	= grams (g)
grams (g)	x.035	= Ounces (oz)
cc's	x.03381	= Fluid Ounces (oz)
lbs	x.454	= kg
kg	x 2.2046	= lbs
Cubic Inches	x 16.387	= Cubic Centermeters
Cubic Centimeters	x.061	= Cubic Inches
Imperial pints	x.568	= liters (l)
liters (l)	x 1.76	= Imperial pints
Imperial quarts	x 1.137	= liters (l)
liters (l)	x.88	= Imperial quarts
Imperial quarts	x 1.201	= US quarts
US quarts	x.833	= Imperial quarts
US quarts	x.946	= liters
liters	x 1.057	= US quarts
US gallon	x 3.785	= liter
liter	x.264	= US gallon
Pounds force per square inch (psi)	x 6.895	= Kilo pascals (kPa)
Kilo pascals (kPa)	x.145	= Pounds force per square inch (psi)

Piston Wash / Spark Plug Reading

Changing temperature, barometer, altitude, and fuel supply are just a few of the factors that can affect the day to day performance of your engine. That is why using Exhaust Gas Temperatures (EGT) are important for maintaining optimum performance. There are two methods for helping you determine what the EGTs are for your machine. Piston wash and the coloring of your spark plug.The piston wash is by far the most valuable tool in concluding EGTs, with the spark plug color running a distant second. Use the illustrations below to help you establish the EGTs for your machine.

Once the proper jetting is established, you can reference the EGT gauge for your baseline numbers. Then, if there is a rise or fall of 25 degrees, you must jet accordingly to return your EGTs to the baseline numbers.


Piston Wash
Wet and Black wash indicates too rich a fuel mixture
Wash
Correct
If the wash is 1/4" - 3/8" and cocoa brown, the machine's EGTs are just right.
Dry
A dry, ash colored piston indicates too lean a mixture for the operating conditions.
Spark Plug Color
If the plug is wet or very dark, the fuel is running too rich.
Correct
If the plug is light to cocoa brown, the machine's EGTs are just right.
A ash white plug with speckles indicates too lean a mixture for the operating conditions.

SERVICE PRECAUTIONS

GENERAL PRECAUTIONS

In order to perform service work efficiently and to prevent costly errors, the technician should read the text in this manual, thoroughly familiarizing him/herself with procedures before beginning. Photographs and illustrations have been included with the text as an aid. Notes, cautions and warnings have also been included for clarification of text and safety concerns. However, a knowledge of mechanical theory, tool use and shop procedures is necessary to perform the service work safely and satisfactorily. Use only genuine Polaris service parts.

⚠ CAUTION

Cleanliness of parts and tools as well as the work area is of primary importance. Dirt and foreign matter will act as an abrasive and cause damage to precision parts. Clean the snowmobile before beginning service. Clean new parts before installing.

⚠ CAUTION

Watch for sharp edges which can cause personal injury, particularly in the area of the tunnel. Protect hands with gloves when working with sharp components.

⚠ CAUTION

If difficulty is encountered in removing or installing a component, look to see if a cause for the difficulty can be found. If it is necessary to tap the part into place, use a soft face hammer and tap lightly.

⚠ CAUTION

Some of the fasteners in the snowmobile were installed with locking agents. Use of impact drivers or wrenches will help avoid damage to fasteners.

⚠ CAUTION

Always follow torque specifications as outlined throughout this manual. Incorrect torquing may lead to serious machine damage or, as in the case of steering components, can result in injury or death for the rider(s).

⚠ CAUTION

If a torquing sequence is indicated for nuts, bolts or screws, start all fasteners in their holes and hand tighten. Then, following the method and sequence indicated in this manual, tighten evenly to the specified torque value. When removing nuts, bolts or screws from a part with several fasteners, loosen them all about 1/4 turn before removing them.

⚠ CAUTION

If the condition of any gasket or O-Ring is in question, replace it with a new one. Be sure the mating surfaces around the gasket are clean and smooth in order to avoid leaks.

⚠ CAUTION

Some procedures will require removal of retaining rings or clips. Because removal weakens and deforms these parts, they should always be replaced with new parts. When installing new retaining rings and clips use care not to expand or compress them beyond what is required for installation.

⚠ CAUTION

Because removal damages seals, replace any oil or grease seals removed with new parts.

⚠ CAUTION

Polaris recommends the use of Polaris lubricants and greases, which have been specially formulated for the top performance and best protection of our machines. In some applications, such as the engine, warranty coverage may become void if other brands are substituted.

⚠ CAUTION

Grease should be cleaned from parts and fresh grease applied before reassembly of components. Deteriorating grease loses lubricity and may contain abrasive foreign matter.

NOTES

CHAPTER 3
Maintenance

PERIODIC MAINTENANCE 3.2
PERIODIC MAINTENANCE SCHEDULE 3.2
MAINTENANCE PRODUCTS 3.4
ENGINE OILS / LUBRICANTS / MISC. 3.4
DRIVE / DRIVEN CLUTCHES 3.5
BELT DEFLECTION INSPECTION 3.5
DEFLECTION ADJUSTMENT - TEAM DRIVEN 3.5
TORQUE STOP ADJUSTMENT 3.6
ENGINE MAINTENANCE 3.6
SURGE TANK 3.6
RECOMMENDED COOLANT 3.6
COOLING SYSTEM BLEEDING 3.6
EXHAUST VALVE CLEANING 3.6
OIL PUMP ADJUSTMENT - 600RR 3.7
OIL PUMP BLEEDING 3.7
OIL / FUEL FILTER 3.7
CHASSIS LUBRICATION 3.8
FRONT SUSPENSION 3.8
REAR SUSPENSION 3.8
THROTTLE CABLE 3.8
CHOKE AND CHOKE CABLE 3.8
CHAINCASE OIL 3.8
CHAINCASE OIL REPLACEMENT 3.9
DRIVE CHAIN TENSION ADJUSTMENT 3.9
BRAKE SYSTEM MAINTENANCE 3.9
BRAKE LEVER TRAVEL 3.9
BRAKE FLUID 3.9
THROTTLE AND CHOKE CABLE ADJUSTMENTS 3.10
IDLE SPEED GAP / THROTTLE FREE PLAY ADJUSTMENT 3.10
CHOKE LEVER ADJUSTMENT 3.10
STEERING / SUSPENSION MAINTENANCE 3.11
HANDLEBARS 3.11
SKI / SKI SKAG FASTENERS 3.12
TRACK TENSION 3.12
TRACK ALIGNMENT 3.13
ELECTRICAL SYSTEMS 3.14
HEADLIGHT BULB REPLACEMENT 3.14
OFF-SEASON STORAGE 3.14
CHASSIS AND HOOD 3.14
CLUTCH AND DRIVE SYSTEM 3.14
CONTROLS AND LINKAGE 3.14
ELECTRICAL CONNECTIONS 3.14
CARBURETOR/THROTTLE BODY 3.14
FUEL SYSTEM 3.14
CORROSION 3.14
SHOCKS 3.14
BATTERY 3.14

PERIODIC MAINTENANCE

Periodic Maintenance Schedule

Periodic Maintenance Table - 600 RR / 600 IQ Racer

Item	Frequency				
	150 mi. (240 km)	500 mi. (800 km)	1000 mi. (1600 km)	2000 mi. (3200 km)	Pre-Season
Drive / Driven Clutch					
Clutch Alignment / Offset		I	I	I	I
Drive Belt Condition		I	I	I	I
Drive / Driven Clutch Condition		I	I	I	I
Drive Belt Tension		I	I	I	I
Engine / Cooling System					
Engine Mounts		I	I	I	I
Recoil Handle / Rope / Function		I	I	I	I
Engine Torque Stop		I	I	I	I
Cylinder Head Bolts	I	I	I	I	
Cylinder Base Nuts		I	I	I	
Ignition Timing				I	I
Spark Plug Condition	I	I	I	R	I
Exhaust System / Retaining Springs		I	I	I	I
VES Valves / Solenoid		I / C	I / C	I / C	I / C
Cooling System / Hoses / Fluid Level				I	I
Heat Exchangers		I	I	I	I
Oil Filter				I	I
Brake System					
Hose Condition / Routing		I	I	I	I
Fluid Level / Leaks / Fluid Condition		I	I	I	I
Brake Pads / Brake Disc		I	I	I	I
Parking Brake		I	I	I	I
Brake Fluid				R	
Fuel System					
Idle RPM		I	I	I	
Carburetor Adjustments		I	I	I	
Throttle Lever / Chock Lever	I	L	L	L	L
Oil Pump Arm				I	I
Throttle / Choke Cables	I	L	L	L	L

Periodic Maintenance Table - 600 RR / 600 IQ Racer

Item	Frequency				
	150 mi. (240 km)	500 mi. (800 km)	1000 mi. (1600 km)	2000 mi. (3200 km)	Pre-Season
Fuel / Vent Hoses	I	I	I	I	I
Fuel Filter				I	
Throttle Position Sensor			I	I	
Oil Hoses / Oil Filter	I	I	I	I	I
Air Box	I		I		I
Electrical System					
Auxiliary Shut-Off / Tether Switch	I	I	I	I	I
Throttle Safety Switch	I	I	I	I	I
Ignition Switch	I	I	I	I	I
Headlights / Brake light / Taillights	I	I	I	I	I
Hand / Thumbwarmers	I	I	I	I	I
Perc Reverse System	I	I	I	I	I
Chassis / Suspension					
Ski Toe Alignment		I	I	I	
Suspension Mounting Bolts	I	I	I	I	I
Steering Fasteners / Linkage / Handlebars	I	I	I	I	I
Driveshaft / Jackshaft Bearings		L	L	L	L
Ski Fasteners		I	I	I	I
Drive Chain Tension	I	I	I	I	I
Chaincase / Gearcase Oil	I	I	I	R	I
Track Alignment / Track Tension	I	I	I	I	I
Rail Slide Condition	I	I	I	I	I
Bogie / Wheel Condition / Fastener Bolts	I	I	I	I	I
Hood / Seat / Chassis / Engine Compartment		C			C

L = Lubricate / I = Inspect or Adjust / R = Replace / C = Clean

MAINTENANCE PRODUCTS

Engine Oils / Lubricants / Misc.

DESCRIPTION	PART NUMBER
Premium 2-Cycle Oil	
Quart	2875035
Gallon	2875036
2.5 Gallon	2874037
16 Gallon	2875038
55 Gallon	2875039
330 Gallon	2875040
VES Gold 2-Cycle Oil	
Quart	2874438
Gallon	2874439
2.5 Gallon	2874443
16 Gallon	2874440
55 Gallon	2874441
330 Gallon	2874442
Racing 2-Cycle Oil	
Quart	2873025
Gallon	2873023
16 Gallon	2873919
PS-4 4-Cycle 0W-50 Oil	
Quart	2874865
55 Gallon	2874867
PS-4 4-Cycle 2W-50 Oil	
Quart	2876244
Gallon	2876245
16 Gallon	2876247
55 Gallon	2876246
Synthetic Chaincase Lubricant	
Quart	2873105
Gallon	2873106
2.5 Gallon	2872952
Antifreeze 60/40 Premix	
Quart	2871534
Gallon	2871323
55 Gallon	2872278
Shock Oil - 5W - Walker Evans	2874522
Shock Oil - Fox	
Quart	2870995
Gallon	2872279
Shock Oil - Ryde FX / Arvin	2873716
Brake Fluid - DOT 4	2872189
Fogging Oil	
Aerosol	2870791
Quart	2871517

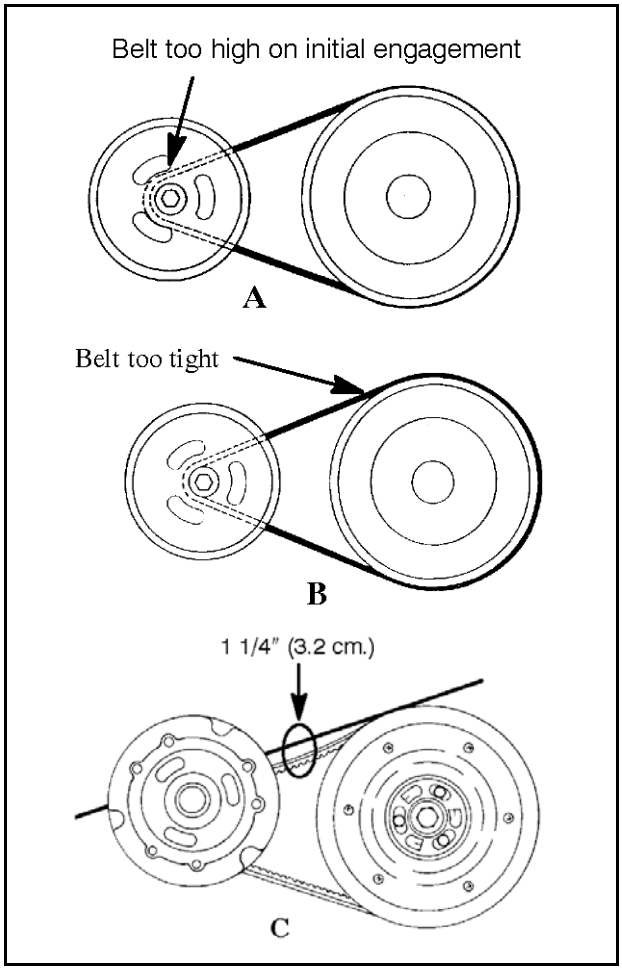
DESCRIPTION	PART NUMBER
Premium All Season Grease	
3oz. Grease Gun Kit	2871312
14oz.	2871423
Starter Grease	2871460
Carbon Clean Plus	2871326
Isopropyl	2870505
Fuel Stabilizer	
Quart	2870652
2.5 Gallon	2872280
Cross Shaft Assembly Lubricant	
8oz.	2872435
2.5 Gallon	2872436
Three Bond Sealant 5oz.	2871557
Loctite 242	2871950

DRIVE / DRIVEN CLUTCHES

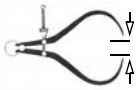
Belt Deflection Inspection

Too much belt deflection is when the belt is too long or the center distance is too short. The initial starting ratio will be too high, resulting in performance loss. This is due to the belt rising too high in the drive clutch sheaves upon engagement (A).

Not enough belt deflection (B) is when the belt is too short or the center distance is too long. The initial starting ratio will be too low. In addition, the machine may creep when the engine idles, causing damage to the internal face of the drive belt.



1. Measure the belt deflection with both clutches at rest and in their full neutral position.
2. Place a straight edge across the tow clutches, on top the belt.
3. Apply downward pressure to the belt and measure the distance at point (D).
4. The measurement should be 1 1/4" (3.2cm).



Belt Deflection: 1.25" (3.2cm)

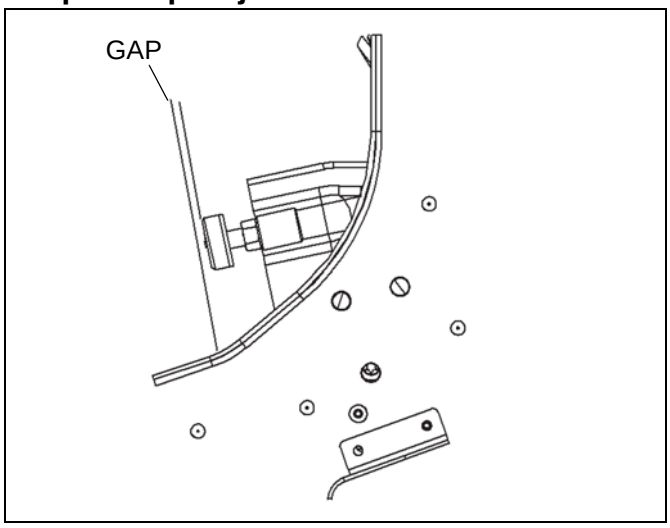
5. If the measurement is not correct adjust driven clutch.

Deflection Adjustment - Team Driven

1. Verify the drive system is FWD drive by rotating the driven clutch forward.
2. While holding the set screw with an Allen wrench, loosen the jam nut.
3. Turn the set screw clockwise while holding the jam nut stationary to increase the distance between the clutch sheaves (increase belt deflection).
4. Turn the set screw counter-clockwise while holding the jam nut stationary to decrease the distance between the clutch sheaves (decrease belt deflection).
5. Secure the jam nut while holding the set screw stationary.
6. Raise the rear of the snowmobile using a track stand to allow the track to spin.
7. Start the engine and apply enough throttle to spin the track.
8. Turn off then engine, then re-check the belt deflection.

NOTE: Do not adjust the belt deflection to the point where the drive belt cord line is visible when the belt is seated in the driven clutch.

Torque Stop Adjustment



Set torque stop bumper gap to specification after aligning drive and driven clutches.

= In. / mm.
Torque Stop Bumper-to-Engine Gap .010 - .030 (.25 - .75mm)

After setting gap, torque jam nut to specification.

= T
Torque Stop Jam Nut: 15-17 ft-lb. (21-24 Nm)

NOTE: Where applicable, when installing a new torque stop, position bumper so the tip is just touching crankcase.

ENGINE MAINTENANCE

Surge Tank

Keep the level of the coolant inside the surge tank at the FULL COLD level mark when the coolant is at room temperature.

Always add coolant when the cooling system is COLD.

⚠ CAUTION
Never remove the fill tube pressure cap when the cooling system is warm. Severe burns to skin may occur from escaping coolant or steam.

Recommended Coolant

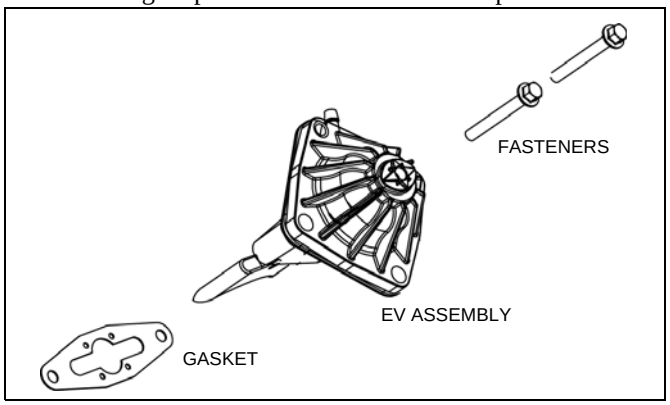
Use Polaris Premium 60 / 40 pre-mix antifreeze. This premium antifreeze is rated for temperatures down to -62°F (-52°C).

Cooling System Bleeding

1. Allow the cooling system to cool completely.
2. Verify the coolant level in the surge tank is at the COLD mark.
3. Remove the pressure cap and fill the fill cap with coolant to the base of the pressure cap seat. Loosely install the pressure cap.
4. Elevate the front of the machine slightly.
5. Apply the parking brake and start the engine.
6. Allow the engine idle time to stabilize, then set the RPM to approximately 600 RPM.
7. Immediately add coolant to the fill tube if the coolant level dropped significantly after the engine started. Watch the level and add more coolant until the level stops dropping.
8. Secure the pressure cap.
9. Verify the tunnel coolers begin to warm up as the engine continues to run.
10. Turn off the engine once the tunnel coolers are sufficiently warmed-up. Release the parking brake.
11. Allow time for the coolant temperature to cool. Re-check the coolant level in the surge tank. Add more coolant if required.
12. Reset the engine idle RPM to specification.

Exhaust Valve Cleaning

The exhaust valve guillotines must be cleaned to ensure maximum engine performance and throttle response.



1. Remove the vent hose from the EV base fitting.
2. Remove the two fasteners that secure the valve assembly to the cylinder, but not the two screws that secure the cover to the EV base.
3. Carefully extract the guillotine out of the cylinder. Discard the gasket.
4. Using a clean rag or shop towel, remove the oil residue from

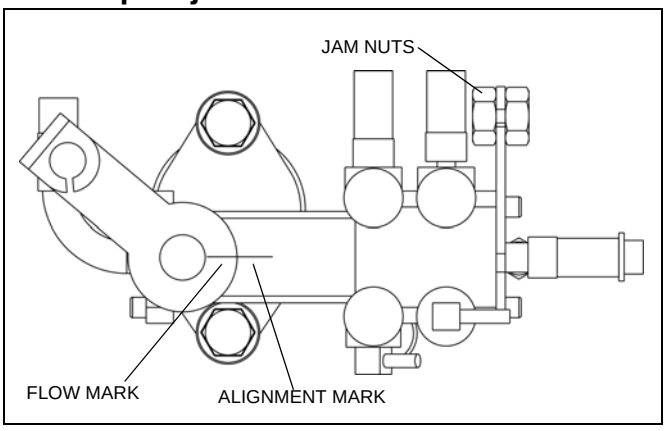
the cylinder, guillotine, and EV base.

5. Inspect the guillotine for signs of damage. Replace guillotine if damage is found, and inspect the cylinder and piston for damage.
6. Clean the guillotine with brake cleaner and a piece of fine steel wool. Clean only to remove hardened carbon deposits.
7. Once clean, rinse blade with mild detergent and water. Dry completely.
8. Install a new gasket, then reinstall the EV assembly. Apply Loctite 242 to the fastener threads, then torque to specification.
9. Reconnect the vent hose.

NOTE: To obtain maximum exhaust valve performance, Polaris recommends using Polaris VES Gold Synthetic Two-Stroke engine oil.
Never mix different brands of engine oil.

= T
Exhaust Valve Housing Fasteners 12 Ft.Lbs. (16 Nm) - Apply Loctite 242

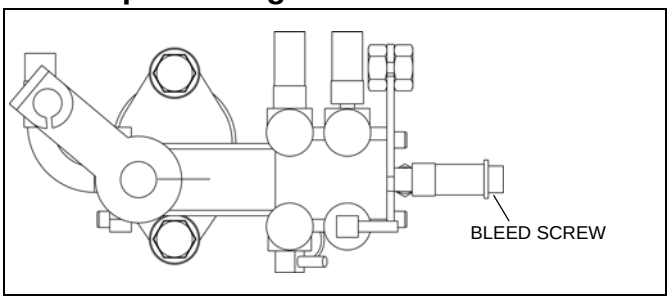
Oil Pump Adjustment - 600RR



NOTE: Before adjusting oil pump, always verify the throttle lever free play and idle speed RPM are set to specification.

1. Verify the oil pump flow mark in line marker is aligned with the oil pump body mark at idle.
2. Lever adjustment is accomplished by loosening the two oil pump cable jam nuts, then moving the threaded barrel up or down until the two marker lines are aligned.
3. Apply Loctite 262 to barrel threads and secure jam nuts when adjustment is set.

Oil Pump Bleeding



1. Verify oil tank is filled with oil.
2. Loosen the bleed screw. Verify a stream of oil flows from the bleed screw.
3. Verify a stream of oil flows from the bleed screw.
4. After bleeding oil pump, secure bleed screw and wipe up oil residue.

NOTE: Any time that the engine is disassembled or repaired, it is important to purge air within the hoses and oil pump.

Oil / Fuel Filter

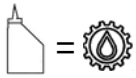
CAUTION
The in-tank fuel filter and fuel lines should be inspected regularly. Special attention should be given to the fuel line condition after periods of storage. Normal deterioration from weather and fuel can occur during this storage period. Do not damage fuel lines when removing them. If a fuel line has been damaged or kinked it must be replaced.

All models feature a fuel pick with filter located inside the fuel tank. To inspect and replace:

1. Remove the gas cap.
2. Use a coat hanger to carefully pickup the fuel hose inside the tank.
3. Inspect and replace the pickup/filter at the end of the hose.

CHASSIS LUBRICATION

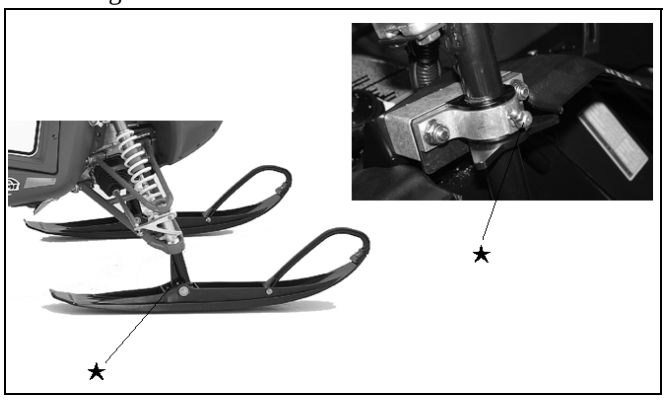
Most chassis, suspension and mechanical grease points should be lubricated Polaris Premium All Season Grease.



Polaris Premium All Season Grease
Part Numbers:
3oz. Grease Gun Kit = 2871312
14oz. Tube = 2871423

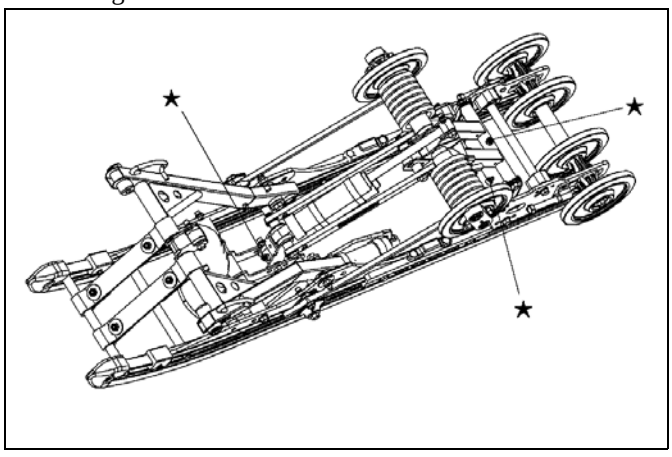
Front Suspension

Lubricate grease zerks with Premium All Season Grease.



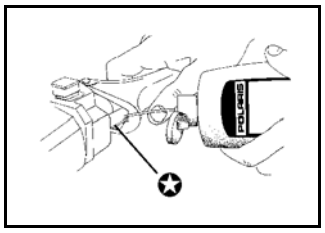
Rear Suspension

Lubricate grease zerks with Premium All Season Grease.



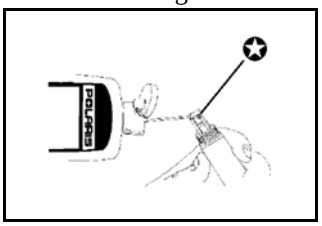
Throttle Cable

Lubricate the throttle cable lightly with fresh oil. With the engine off, turn the handlebars to the left and lubricate well as shown.



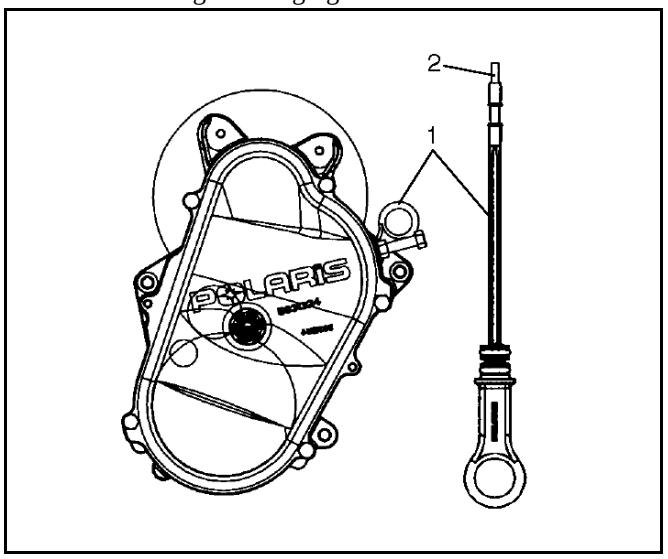
Choke And Choke Cable

Lubricate the choke slide and cables lightly with oil or grease. Before turning the engine off, operate the choke intermittently to draw moisture out of the choke plunger area and reduce the possibility of the choke becoming frozen.



Chaincase Oil

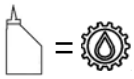
Maintain the oil level between the “safe” marks on the dipstick whenever checking or changing oil.



1. Position the vehicle on a level surface
2. Remove the dipstick (1). Verify level is in SAFE zone.
3. Add the recommended oil as needed. Do not overfill.
4. Clean the magnetic tip (2) on the dipstick.
5. Reinstall the dipstick.

Chaincase Oil Replacement

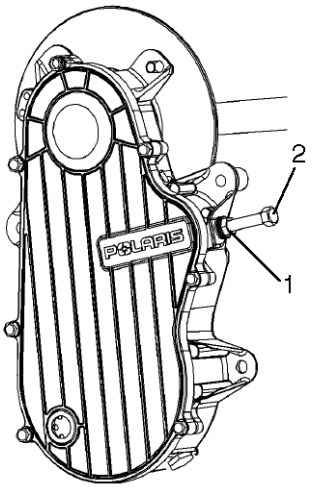
1. Locate the chaincase or gearcase drain plug access hole on the bottom of the nosepan.
2. Place an oil catch pan under the drain plug.
3. Remove the drain plug and drain the oil into the catch pan.
4. Clean the magnetic plug to remove metal shavings.
5. Install drain plug and hand-tighten. Do not over-tighten the drain plug.
6. Fill chaincase or gearcase at the dipstick hole.



Chaincase Oil Capacity = 9oz. (266.2 ml)
Recommended Lubricants:
Chaincase = Polaris Synthetic Chaincase Lubricant

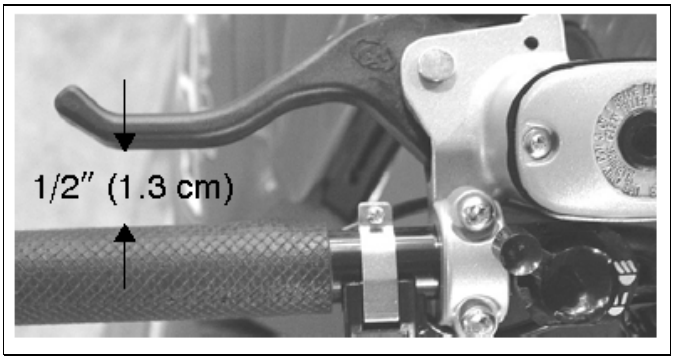
Drive Chain Tension Adjustment

1. Rotate the driven clutch counterclockwise to move all of the slack in the chain to the tensioner side. Lock the parking brake, or have an assistant hold the brake lever.
2. Loosen the adjuster bolt jam nut (1).
3. Finger tighten the adjuster bolt (2) until it can no longer be adjusted by hand, then back 1/4 turn.
4. Tighten the jam nut while holding the adjuster bolt. Torque to 21 ft.lbs. (28 Nm).
5. Release the brake lever lock.



BRAKE SYSTEM MAINTENANCE

Brake Lever Travel



The brake lever travel should have a clearance no less than 1/2″ (1.27cm) from the handlebar grip. Inspection should be made with the lever firmly depressed. If the lever has less than this amount you may need to bleed the brake system.

Brake Fluid

WARNING

Do not over fill the master cylinder. Fluid expansion could cause brakes to lock, resulting in serious injury or death. Once a bottle of brake fluid is opened, use what is necessary and discard the rest. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture from the air. This causes the boiling temperature of the brake fluid to drop, leading to early brake fade and the possibility of serious injury

Inspect the reservoir to be sure it contains the correct amount of fluid. Use only Polaris DOT 4 high temperature brake fluid. Change fluid every 2 years or whenever the fluid is dark or contamination is suspected.

NOTE: A low brake fluid level can be indicated through the sight glass on the cover. If the fluid is low this sight glass will glow a brighter. color.

LOW

FULL

THROTTLE AND CHOKE CABLE ADJUSTMENTS

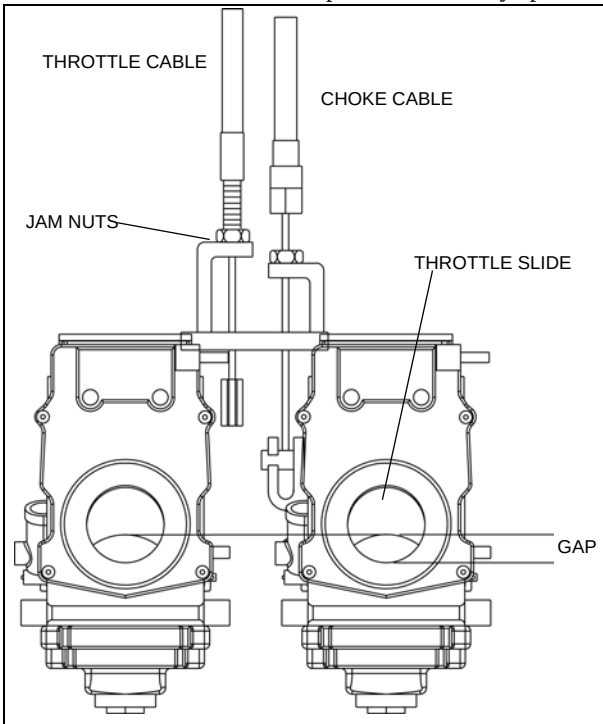
Idle Speed Gap / Throttle Free Play Adjustment

⚠ CAUTION

When adjusting throttle lever free play, always verify the engine idle RPM does not increase when turning the handle bar to the full-left or full-right positions.

After idle speed adjustments are made, the throttle lever clearance and oil pump adjustment must be checked and adjusted.

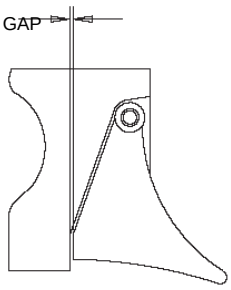
1. Always set the idle speed when the engine is at operating temperature.
2. Reference the Throttle Gap Under Cutaway specification.



= In. / mm.

Throttle Gap Under Cutaway
2008 600 RR Gap = 2.5mm
2008 IQ 600 Racer Gap = 2.0mm

3. Turn the idle speed adjustment screw on the carburetor rack clockwise or counter-clockwise until the gap under the throttle slide is set to specification.
4. Set the throttle lever free play by loosening the throttle cable jam nuts.



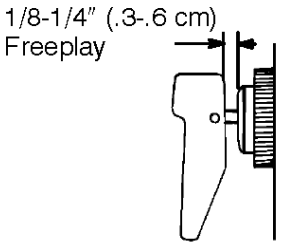
= In. / mm.

Throttle Lever Free Play
.010″ - .030″ (.25 - .80mm)

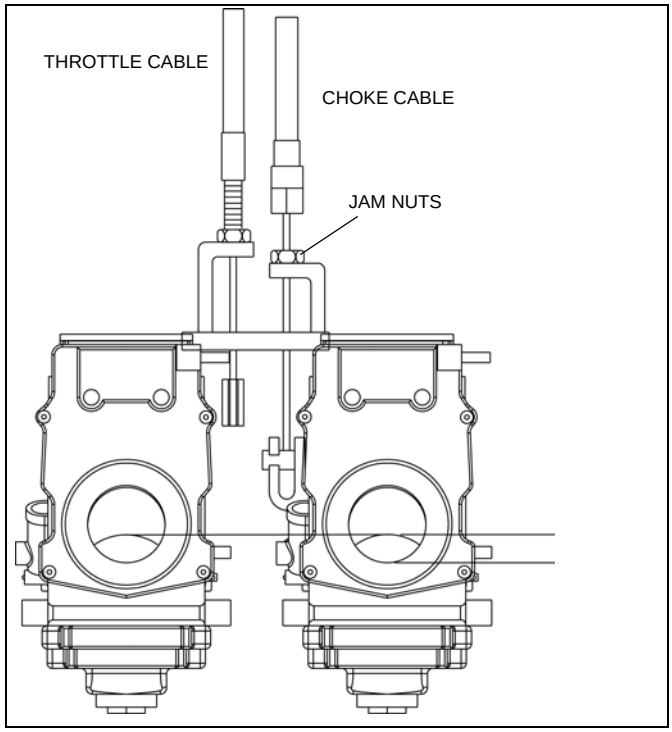
5. Secure the adjuster jam nuts.

Choke Lever Adjustment

1. Flip the choke toggle to the “OFF” position.



2. Loosen choke cable lock nuts.



3. Adjust the lock nuts on the carburetor until choke toggle has zero free play, then set the lock nuts so there is 1/8" to 1/4" (.3 - .6) toggle free play.

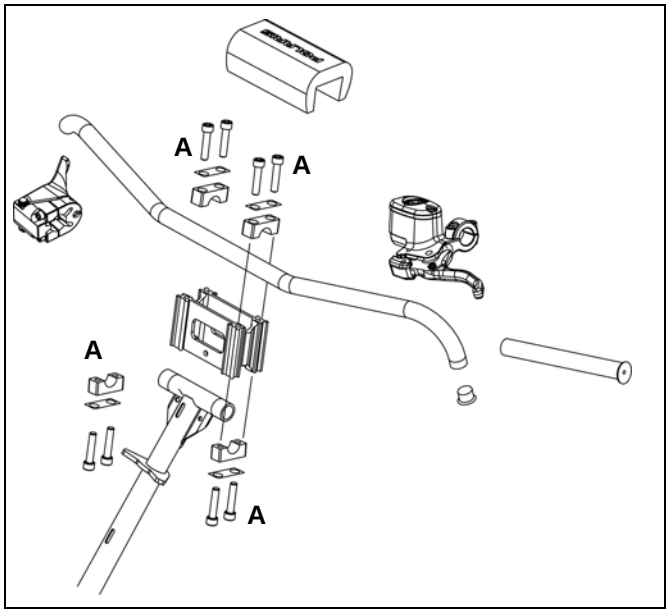
NOTE: Verify the plungers do not lift when checking the free play.

4. Tighten adjustment lock nuts.

STEERING / SUSPENSION MAINTENANCE

Handlebars

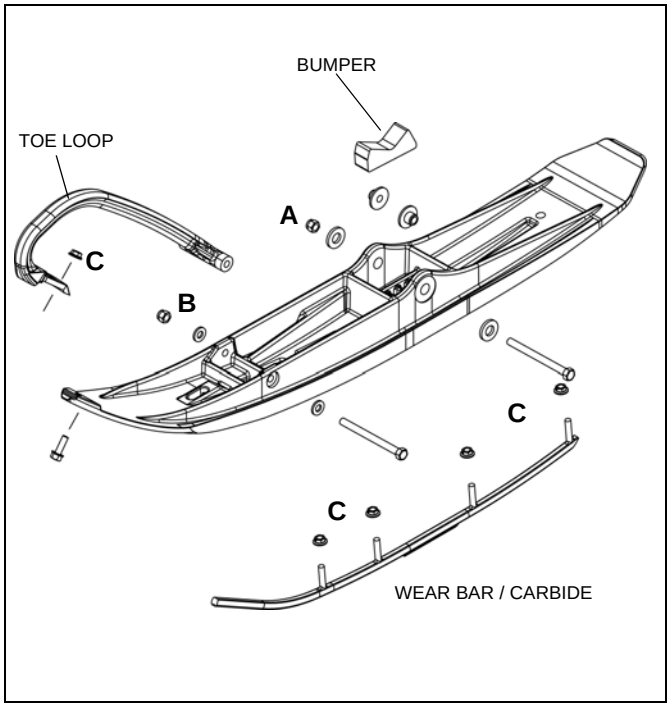
Periodically inspect the torque of the handlebar clamp fasteners.



= T
A = 15 - 17 Ft.Lbs. (20 - 23 Nm)

Ski / Ski Skag Fasteners

Periodically inspect the ski-to-spindle fasteners for proper torque.



CAUTION

Never re-use lock nuts. Always re-assemble using new lock nuts.

= T

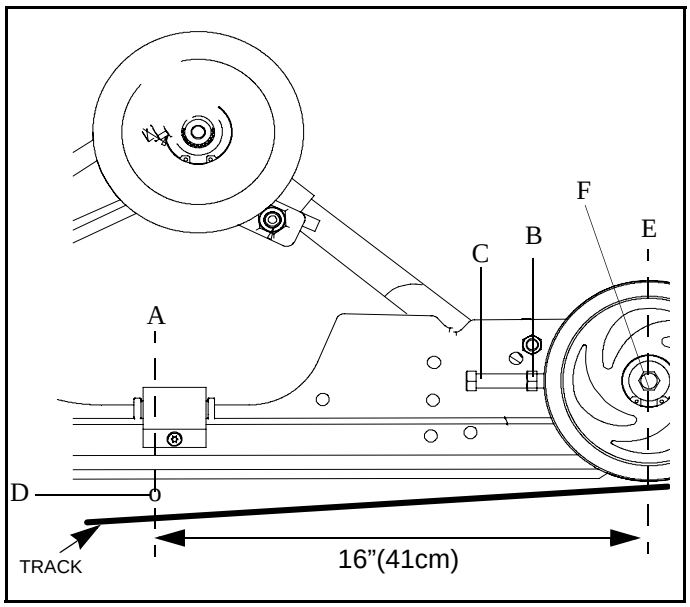
A = 36 Ft.Lbs. (49 Nm)
B = 5 - 7 Ft.Lbs. (7 - 9 Nm)
C = 8 - 10 Ft.Lbs. (11 - 13 Nm)

Assembly Notes:

- Install spindle bumper with flat-side facing forward.
- Replace wear bar / carbide when damaged or when carbide edge is worn away.

Track Tension

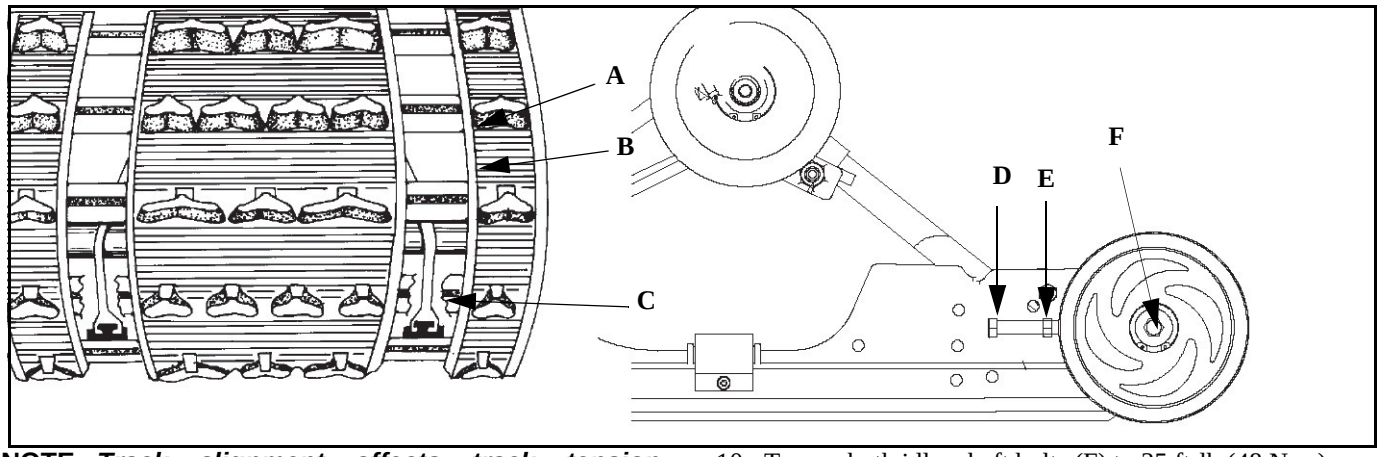
Track tension is critical for maintaining correct suspension operation. If the track tension is too loose it may cause the track to slip or “ratchet”. If the track is too tight it will wear down the rail slides, reduce top speeds, cause rear suspension vibration and cause track and rear suspension durability problems.



1. Lift the rear of the machine and place a jack stand or secure the rear of the machine so that the track is off of the ground.
2. Start the engine and slowly let the engine turn the track over. This will warm up the track for a correct measurement.
3. Shut off the engine.
4. Place a 10 lb. (4.54kg) weight at point (A). Point (A) is 16” (41cm) ahead of the rear idler shaft (E).
5. Measure the distance (D) between the rail slider and the track. This measurement should fall with in the measurement range for the appropriate vehicle, see chart o this page.
6. If adjustment is needed, loosen up the lock nuts (B) on each side.
7. Loosen up the idler shaft bolts (F).
8. Turn each adjuster bolt (C) clockwise to tighten track. Turn the adjuster bolt counterclockwise to loosen track tension.
9. Torque the lock nuts (B) and idler shaft bolts on each side to 35 ft-lb (48 N-m).

SUSPENSION	MEASUREMENT
IQ 121 Racer	1 1/4" - 1 1/2" (3.1 - 3.8cm)

Track Alignment



NOTE: ***Track alignment affects track tension. Misalignment of the track will cause excessive wear to the track, rail slides, and rail.***

NOTE: ***Excessive rail slide wear occurs due to running in inadequate snow conditions.***

Periodically check that the track is centered and running evenly on the slide rails. Misalignment will cause excessive wear to the track and slide rails.

1. Safely lift and support the rear of the snowmobile off the ground.
2. Rotate the track by hand to check for any possible damage.
3. Inspect the track rods (A) carefully and examine the track along the entire length of each rod, bending the track edge and inspecting it for breakage. If any rod damage is found, the track should be replaced.
4. Warm up the track by starting the engine and apply a small amount of throttle so the track runs slowly at least five complete revolutions.
5. Stop the engine and turn the ignition off.
6. Inspect track alignment by carefully looking through the track window (B) to make sure the rails (C) are evenly spaced on each side.
7. If the track runs to the left, loosen the left locknut and tighten the left adjusting bolt (D). If the track runs to the right, loosen the right locknut and tighten the right adjusting bolt. It may be necessary to check this with the engine rotating the track. Be sure to SHUT THE MACHINE OFF before making any further adjustments.
8. Loosen up the rear idler shaft (F).
9. After any adjustments are complete, be sure to torque the locknuts (E) to 35 ft-lb (48 N-m).

= T
Adjuster Lock Nuts: 35 ft-lb (48 N-m)

10. Torque both idler shaft bolts (F) to 35 ft-lb (48 N-m).

= T
Idler Shaft Bolt: 35 ft-lb (48 N-m)

WARNING

Broken track rods can cause a rotating track to come off the machine. Never operate or rotate a damaged track under power with a broken rod. Serious injury or death may occur.

Stay clear of all moving parts to avoid personal injury. Never make any adjustments with the engine running, as serious personal injury can result.

ELECTRICAL SYSTEMS

Headlight Bulb Replacement

NOTE: Do not touch the bulb with your fingers. The grease from body oil will cause a hot spot on the bulb and cause bulb failure. If you do touch the bulb clean the bulb with isopropyl alcohol.

1. Push in on the "PUSH" section of the plenum.
2. Slide the access panel down to gain access to the bulb.
3. Squeeze and move the bulb clip up.
4. Replace the bulb, clip and access panel.

OFF-SEASON STORAGE

Chassis And Hood

Proper storage starts by cleaning, washing and waxing the hood, chassis, upholstery and plastic parts. Clean and touch up with paint any rusted or bare metal surfaces. Ensure that all corrosive salt and acids are removed from surfaces before beginning preservation with waxes and rust inhibitors (grease, oil, or paint).

If the machine is equipped with a battery, disconnect the battery cables and clean the cables and battery posts. Fill battery to proper level with distilled water and charge to full capacity. Remove and store the battery in a cool dry place.

The machine should be stored in a dry garage or shed out of the sunlight and covered with a fabric snowmobile cover. Do not use plastic to cover the machine; moisture will be trapped inside causing rust and corrosion problems.

Clutch And Drive System

Remove drive belt and store in a cool dry location. Lubricate sheave faces and ramps of drive and driven clutches with light oil or rust inhibitor. All lubrication applied as a rust preventative measure must be cleaned off before installing belt for service and operating machine.

Controls And Linkage

All bushings, spindle shafts and tie rod ends should be coated with a light coat of oil or grease. Throttle controls and cables should be lubricated. Force a small amount of lubricant down cables.

Electrical Connections

Separate electrical connector blocks and clean corrosive build-up from connectors. Lubricate or pack connector blocks with Nyogel™ grease and reconnect. Replace worn or frayed electrical wire and connectors.

Carburetor/Throttle Body

Fog engine with Polaris Fogging Oil (aerosol type) according to directions on can.

Fuel System

Treat the fuel system with Polaris Carbon Clean. If Polaris Carbon Clean is not used, fuel tank, fuel lines, and carburetor should be completely drained of gasoline.

Corrosion

To prevent corrosion, always grease jackshaft and drive shaft (clutch side) bearings with Polaris Premium all season grease. Loosen driven clutch retaining bolt and pull clutch outward to expose bearing. Use a point type grease gun fitting to inject grease through hole in flangette into bearing until grease purges out inside or outside bearing seal. Push clutch back on shaft and replace clutch retaining bolt. Inject grease into fitting on speedometer drive adaptor until grease purges out inside or outside the bearing seal. Lubricate both front ski pivots at bushings and spindles.

Shocks

Use T-9 Metal Protectant (or equivalent) on shock absorber shafts to help prevent corrosion.

Battery

Disconnect and remove the battery. Clean the terminals and cables. Apply dielectric grease to the terminals. Store in a cool dry place for storage.

CHAPTER 4
Fuel Systems

SERVICE WARNINGS AND PRECAUTIONS 4.2
SERVICE WARNINGS 4.2
CARBURETOR FUEL SYSTEMS 4.3
MIKUNI MAIN JETS 4.3
MIKUNI PILOT JETS 4.3
MIKUNI STARTER JETS 4.3
MIKUNI JET NEEDLES 4.4
MIKUNI (SHORT) PILOT AIR JETS 4.4
MIKUNI (LONG) PILOT AIR JETS 4.4
MIKUNI PISTON VALVES 4.4
MIKUNI (NOTCHED) PISTON VALVES 4.4
MIKUNI TM CARBURETOR 4.5
FUNCTION 4.5
FLOAT SYSTEM 4.5
FUEL METERING 4.5
FUEL DELIVERY 4.5
PILOT JET 4.6
FUEL SCREW 4.6
MAIN JET 4.6
JETTING GUIDELINES 4.6
PISTON VALVE OR THROTTLE VALVE 4.6
JET NEEDLE 4.7
NEEDLE JET 4.7
THROTTLE OPENING VS. FUEL FLOW 4.8
FUEL PUMP 4.9
FUEL PUMP OVERVIEW 4.9
MAINTENANCE 4.9
CARBURETOR SERVICE 4.10
DISASSEMBLY 4.10
ASSEMBLY 4.11
CARBURETOR ADJUSTMENT 4.12
THROTTLE VALVE SYNCHRONIZATION 4.12
FUEL TANK 4.13
600 RR FUEL TANK ASSEMBLY 4.13
IQ 600 RACER FUEL TANK ASSEMBLY 4.13
EXHAUST SYSTEM 4.14
PIPE AND RESONATOR ASSEMBLY 4.14

SERVICE WARNINGS AND PRECAUTIONS

Service Warnings

When servicing the fuel system, it is important to heed the following warnings.

⚠ WARNING

PROPOSITION 65 WARNING
Snowmobile engines discharge fuel and exhaust which contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm, onto the snow on which they operate. Keep this engine properly tuned and avoid unnecessary idling and spillage during fueling.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored or used.

Do not overfill the tank past the bottom of the filler neck.

If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately.

Never start the engine or let it run in an enclosed area.

Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

CARBURETOR FUEL SYSTEMS

Mikuni Main Jets

MAIN JET	PART NUMBER	MAIN JET	PART NUMBER	MAIN JET	PART NUMBER	MAIN JET	PART NUMBER
95	3130102	175	3130118	310	3130134	470	3130147
100	3130103	180	3130119	320	3130135	490	3130148
105	3130104	185	3130120	330	3130136	500	3130149
110	3130105	190	3130121	340	3130137	510 N	3131400
115	3130106	195	3130122	350	3130138	520 N	3131401
120	3130107	200	3130123	360	3130139	530 N	3131402
125	3130108	210	3130124	370	3130290	540 N	3131408
130	3130109	220	3130125	380	3130140	550 N	3131409
135	3130110	230	3130126	390	3130480	560 N	3131410
140	3130111	240	3130127	400	3130141		
145	3130112	250	3130637	410	3130599		
150	3130113	260	3130129	420	3130142		
155	3130114	270	3130130	430	3130143		
160	3130115	280	3130131	440	3130144		
165	3130116	290	3130132	450	3130145		
170	3130117	300	3130133	460	3130146		

Mikuni Pilot Jets

PILOT JET NUMBER	PART NUMBER
25	3130064
30	3130065
35	3130066
40	3130067
45	3130068
50	3130629
55	3130070
60	3130071

Mikuni Starter Jets

STARTER JET	PART NUMBER
130	3130805
135	3130767
140	3130768
145	3130769

STARTER JET	PART NUMBER
150	3130770
155	3130771
160	3130772

Mikuni Jet Needles

JET NEEDLE	PART NUMBER
J8-9FH04-57	3130794
J8-9EH01-57	3130795
J8-9DH01-54	3130796
J8-8BEY01	3131250
J8-9DFH06-57	3131253
J8-9EFH01-60	3131207
J8-9DFH07-60	3131268
J8-9DFH10-57	3131313
J8-9DGI01-60	3131377
J8-9DGJ02-57	3131378
J8-9EFY02-61	3131202
J8 - 9DGN6-57	3131438

Mikuni (Short) Pilot Air Jets

AIR JET	PART NUMBER
0.5	3130773
0.6	3130774
0.7	3130775
0.8	3130776
0.9	3130777
1.0	3130778
1.1	3130799
1.2	3130780
1.3	3130781
1.4	3130782
1.5	3130783
1.6	3130784
1.7	3130785
1.8	3130786
1.9	3130787
2.0	3130788

Mikuni (Long) Pilot Air Jets

AIR JET	PART NUMBER
0.5	3131255
0.6	3131249
0.7	3131256
0.8	3131254
0.9	3131203
1.0	3131257

AIR JET	PART NUMBER
1.1	3131258
1.2	3131259
1.3	3131260
1.4	3131261
1.5	3131262
1.6	3131263
1.7	3131264
1.8	3131265
1.9	3131266
2.0	3131267

Mikuni Piston Valves

PISTON VALVE	PART NUMBER
1.5	3130940
2.0	3131252
2.5	3130790
3.0	3130791
3.5	3130792
4.0	3130793

Mikuni (Notched) Piston Valves

PISTON VALVE	PART NUMBER
1.5	3131216
2.0	3131206
2.5	3131217
3.0	3131218
3.5	3131219
4.0	3131220

MIKUNI TM CARBURETOR

Function

The function of a carburetor is to produce a combustible air/fuel mixture by breaking fuel into tiny particles in the form of vapor, to mix the fuel with air in a proper ratio, and to deliver the mixture to the engine. A proper ratio means an ideal air/fuel mixture which can burn without leaving an excess of fuel or air. Whether the proper mixture ratio is maintained or not is the key to efficient engine operation.

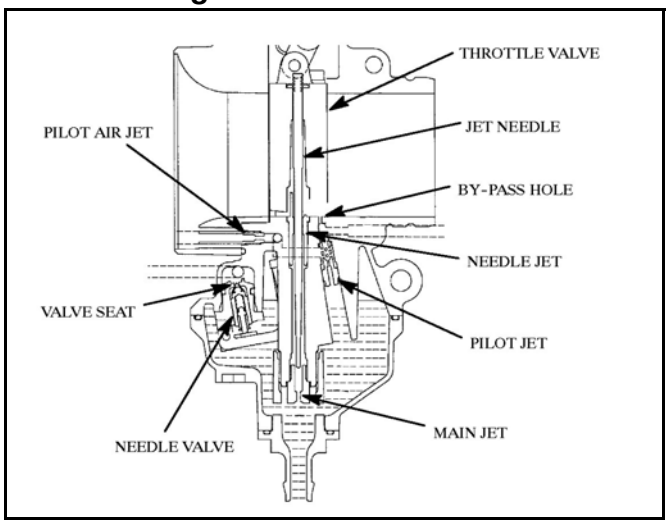
The engine of a vehicle is operated under a wide range of conditions, from idling with the throttle valve remaining almost closed, to full load or maximum output with the throttle valve fully opened. In order to meet the requirements for the proper mixture ratio under these varying conditions, a low speed fuel system, or pilot system, and a main fuel system are provided in Mikuni type carburetors. The Mikuni carburetor has varying operations depending upon varying driving conditions. It is constructed of a float system, pilot system, main system, and starter system or initial starting device.

Float System

The float system is designed to maintain a constant height of gasoline during operation. When the fuel flowing from the fuel pump into the float chamber through the needle valve reaches the constant fuel level, the floats rise. When the buoyancy of the float and the fuel pressure of the fuel pump balance, the needle valve sticks fast to the needle seat, preventing further delivery of gasoline, thereby holding the standard level of gasoline.

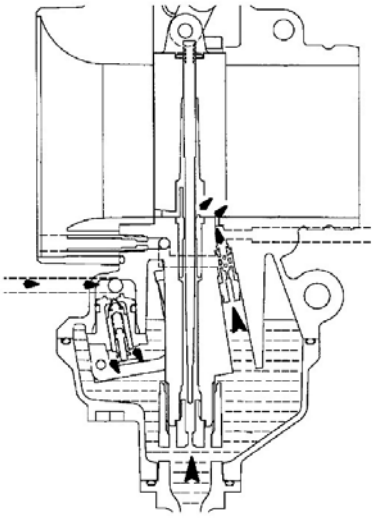
The fuel level in the bowl assists in controlling the amount of fuel in the fuel mixture. Too high a level allows more fuel than necessary to leave the nozzle, enriching the mixture. Too low a level results in a leaner mixture, since not enough fuel leaves the nozzle. Therefore, the predetermined fuel level should not be changed arbitrarily.

Fuel Metering



Mikuni carburetors use a starter enricher system rather than a choke. In this type of carburetor, fuel and air for starting the engine are metered with entirely independent jets. The fuel metered in the starter jet is mixed with air and is broken into tiny particles in the emulsion tube. The mixture then flows into the plunger area, mixes again with air coming from the air intake port for starting and is delivered to the engine through the fuel discharge nozzle in the optimum air/fuel ratio. The starter is opened and closed by means of the starter plunger. The starter type carburetor is constructed to utilize the negative pressure of the inlet pipe, so it is important that the throttle valve is closed when starting the engine

Fuel Delivery



FUEL DELIVERY

The pilot system's main function is to meter fuel at idle and low speed driving. Though its main function is to supply fuel at low speed, it does feed fuel continuously throughout the entire operating range.

Fuel for the pilot jet is drawn from the float bowl, mixed with air jet, and delivered to the engine through the pilot outlet.

The mixture is regulated to some degree by adjusting the fuel screw.

The main system is designed to deliver fuel between low speed and high speed operation. This system is made up of the jet needle, needle jet, and main jet. The main system begins to take effect as soon as there is enough air flow into the carburetor venturi to draw fuel up through the main jet and needle jet assembly. This system works in conjunction with the needle jet system.

During low speed driving, there is very little clearance between the jet needle and the needle jet; therefore, very little fuel from the main jet can pass between the jet needle and the needle jet. As the throttle valve opening is increased, the tapered jet needle is raised farther out of the needle jet, allowing greater fuel flow. Under full throttle opening, the cross sectioned area of clearance between the jet needle and the needle jet becomes greater than the cross sectioned area of the main jet. Thus the main jet is now controlling the amount of fuel flow.

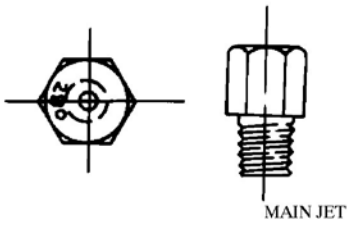
Pilot Jet

From idling to low speeds, the fuel supply is metered by the pilot jet. There are several air bleed openings in the sides of the pilot jet which reduce the fuel to mist. The number stamped on the jet is an indication of the amount of fuel in cc's which passes through the jet during a one minute interval under a given set of conditions.

Fuel Screw

The fuel screw controls the fuel mixture from idle to low speeds. The tapered tip of the fuel screw projects into the passage leading to the by pass out let. By turning the screw in or out, the cross sectional area of the air passage is varied, in turn varying the fuel screw varies the amount of air/fuel.

Main Jet



When the throttle opening becomes greater and the area between the needle jet and jet needle increases, fuel flow is metered by the main jet. The number on the jet indicates the amount of fuel which will pass through it in one minute under controlled conditions. Larger numbers give a greater flow, resulting in a richer mixture. Main jets are screwed directly into the needle jet base.

Jetting Guidelines

Changes in altitude and temperature affect air density, which is essentially the amount of oxygen available for combustion. In low elevations and cold temperatures, the air has more oxygen. In higher elevations and higher temperatures, the air is less dense.

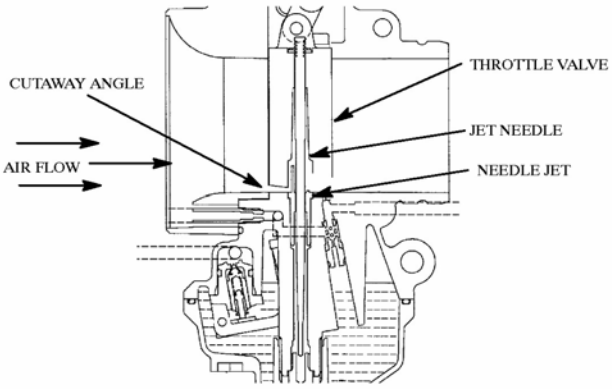
Verify the production setting for your specific model. All carburetors must be re-calibrated if operated outside the production temperature and/or altitude range. The main jet installed in production is not correct for all altitudes and/or temperatures. Refer to the jetting cart in the Specifications Chapter of this manual for correct jetting for altitude/ temperature ranges.

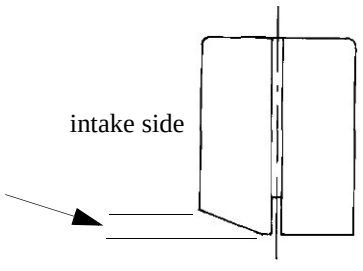
NOTE: It is the owner's responsibility to ensure that the correct jets are installed in the machine for a geographical area. Be very careful when jetting down in warm weather. As the weather turns colder it will be necessary to re-jet upward to prevent engine damage. When selecting the proper main jet always use the lowest elevation and temperature that is likely to be encountered.

⚠ CAUTION

A Main Jet that is too small will cause a lean operation condition and may cause serious engine damage. Jet the carburetors carefully for elevation and temperature according to the jetting charts in the, Specifications Chapter of this manual or the models Owner's Manual Supplements.

Piston Valve Or Throttle Valve





The throttle valve controls the rate of engine air intake by moving up and down inside the main bore. At small throttle

openings, air flow control is performed chiefly by the cutaway. By controlling air flow the negative pressure over the needle valve is regulated, in turn varying the fuel flow.

The throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway in millimeters. The higher the number, the leaner the gasoline/air mixture.

Jet Needle

The jet needle tapers off at one end and the clearance between the jet needle and the needle jet increases as the throttle valve opening gets wider. The air/fuel mixture ratio is controlled by the height of the “E” ring inserted into one of the five slots provided in the head of the jet needle.

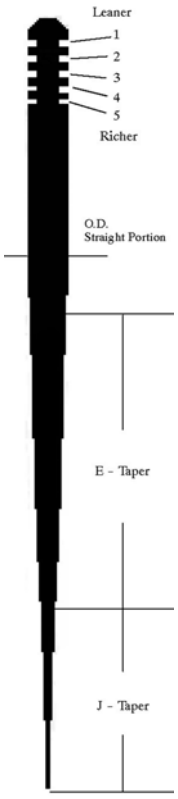
This needle (example) is a 9DH01-57. The first number is the approximate overall length in 10mm increments of the jet needle. The 9 indicates the needle is approximately 90mm but less that 100mm in length.

The letters on the jet needle indicate the angle of both tapers. The first letter designates the taper angle of the top section (closest to the grooves) and the second letter designates the angle of the bottom taper. The taper angles are graduated in 15' (15 minute) increments. The jet needle marked 9DH01-57 would have a top taper of 1°0' and a bottom taper of 2°0'.

The number following the letters on the jet needle is the serial number and it varies with individual jet needles.

The last number, 57 indicates that the outside diameter is 2.57mm. The smaller the O.D., the richer the mixture.

9DH01-57

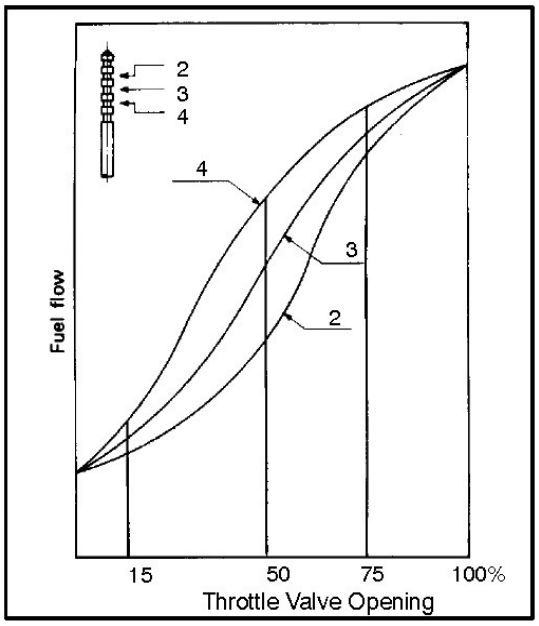


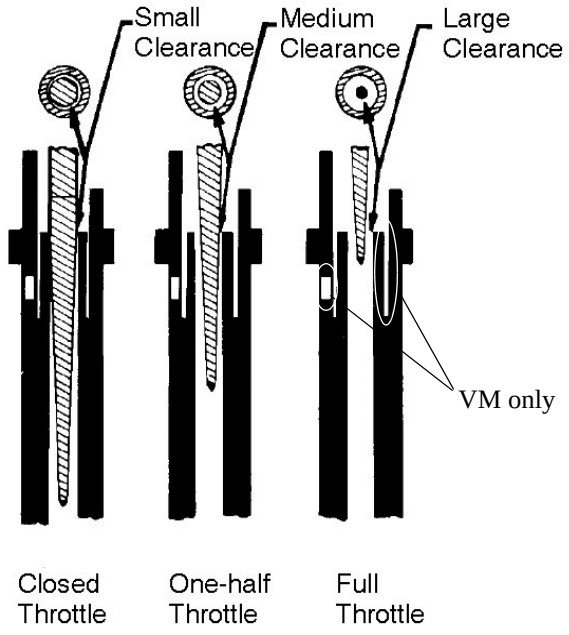
DESIGNATOR	DESCRIPTION
9	Overall length in 10mm increments
D	Taper of the **top** section of the needle
H	taper of the **bottom** section of the needle
01	Serial number
-57	Outside diameter (O.D.) of the straight portion

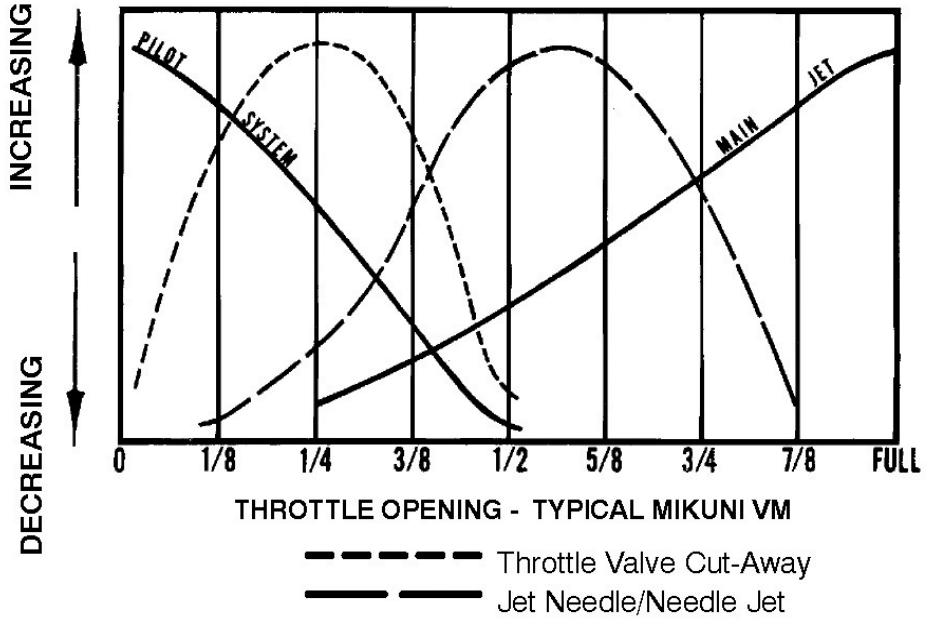
Needle Jet

The needle jet works in conjunction with the jet needle.

Throttle Opening Vs. Fuel Flow

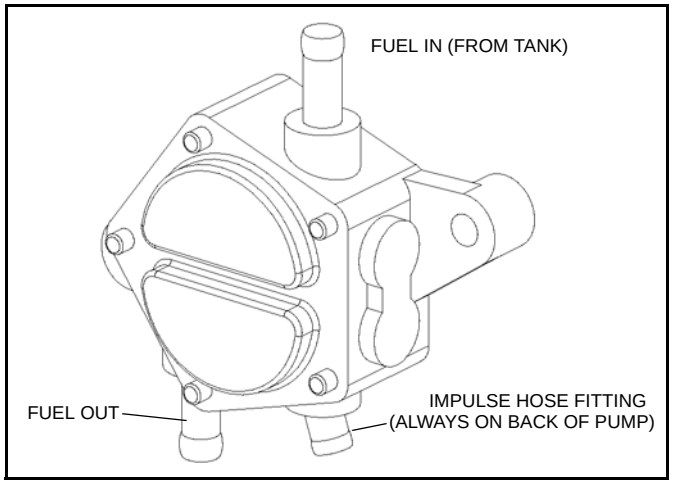

2
3
4
4
3
2
Fuel flow
15
50
75
100%
Throttle Valve Opening


Small Clearance
Medium Clearance
Large Clearance
VM only
Closed Throttle
One-half Throttle
Full Throttle


INCREASING
DECREASING
PILOT SYSTEM
MAIN JET
0
1/8
1/4
3/8
1/2
5/8
3/4
7/8
FULL
THROTTLE OPENING - TYPICAL MIKUNI VM
Throttle Valve Cut-Away
Jet Needle/Needle Jet

FUEL PUMP

Fuel Pump Overview



The impulse-powered fuel pump on carbureted engines works by using the positive and negative pressure pulses generated by the movement of the pistons inside the engine crankcase.

When the MAG piston is on the upward stroke, negative (vacuum) pressure pulse is applied to the fuel pump. This action draws fuel into the pump from the fuel tank.

When the MAG piston is on the downward stroke, a positive pressure pulse is applied to the fuel pump. This action forces fuel from the intake-side of the pump to the supply-side, then to the carburetors.

A series of check valves prevents fuel from being drawn out of the carburetors on the vacuum stroke or forced back into the fuel tank during the pressure stroke.

Maintenance

The impulse operated-powered fuel pump does not require any specific scheduled maintenance. However, the following procedures should be observed:

- Operation

The pump may be checked for operation by removing the fuel supply line from the carburetor and placing it into a container. With the engine idling at approximately 2000 RPM, a steady flow of fuel should be visible.

- Cleaning

The impulse line must be disassembled and cleaned of foreign material in the event of piston or other internal engine part failures which produce fragments.

- Inspection

Disconnect impulse line from pump. Connect a Mity Vac to impulse fitting (or line) and apply 4-6 PSI pressure. Diaphragm should hold pressure indefinitely.

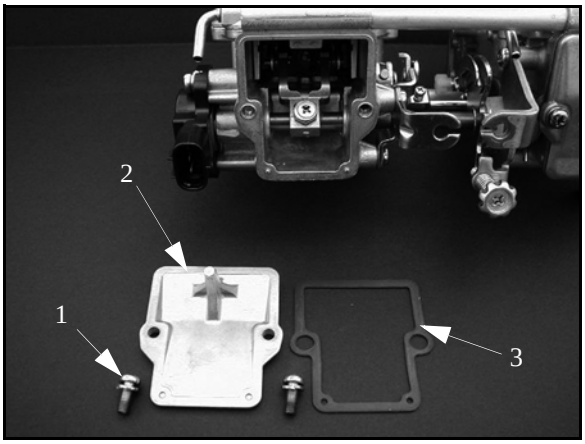
CARBURETOR SERVICE

Disassembly

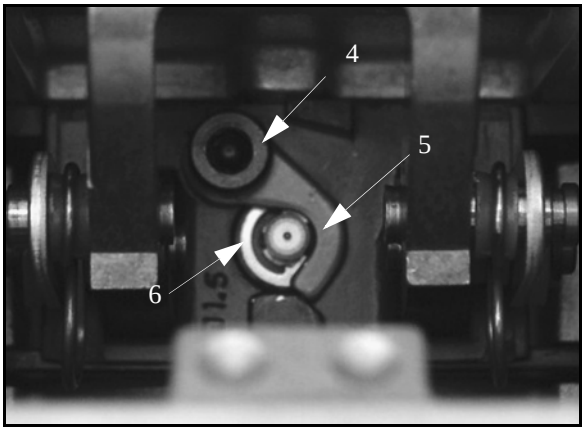
⚠ CAUTION

WEAR EYE PROTECTION WHEN USING COMPRESSED AIR OR WHEN USING CLEANING SOLVENTS. REVIEW ALL FUEL SYSTEM WARNINGS LOCATED AT THE BEGINNING OF THIS CHAPTER BEFORE PROCEEDING.

1. Remove the carburetor from the engine before disassembling. Clean the outside of the carburetor thoroughly with solvent. Do not use compressed air to dry at this time.
2. Remove all top cap screws (1), top cap (2) and gasket (3).

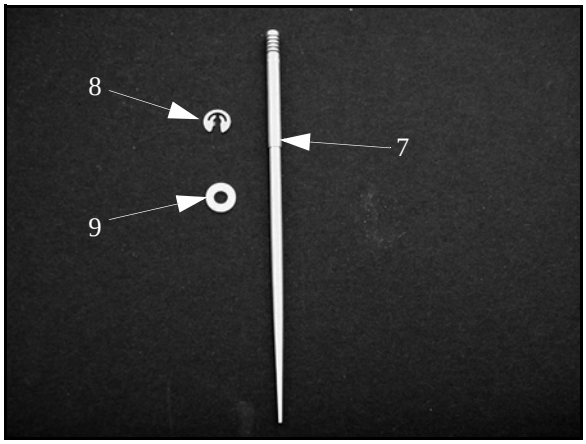


3. Locate the arm screw (4) and loosen it just enough to move the arm (5) out of the way so that you can remove the needle (6) e-clip and the plastic washer from the throttle slide.

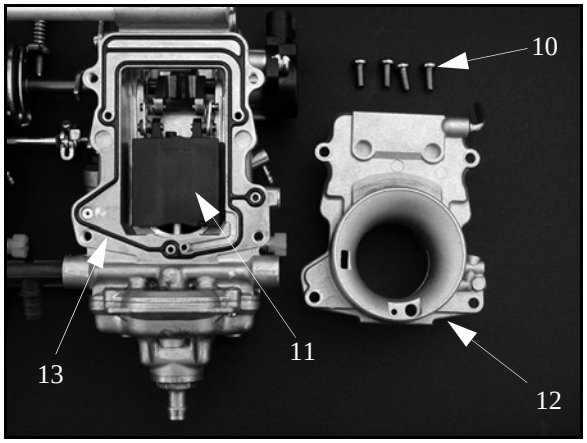


NOTE: Keep track of the plastic washer (9), and place it so it is on the top of the throttle valve when installing the needle and e-ring back into the carburetor.

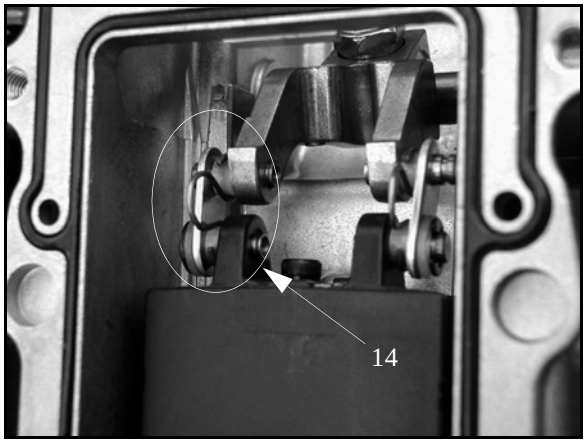
4. Inspect the needle (7), e-clip (8), and plastic washer (9) for wear.



5. Remove the four screws (10) on the funnel face.
6. Turn throttle shaft so the throttle slide (11) slides open all the way.
7. With slide fully open, pull funnel (12) out from the bottom first. Inspect the gasket (13).
8. Check for wear on the faces of the slides.

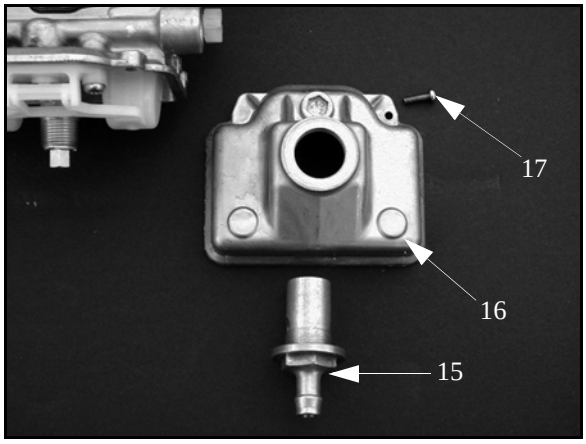


9. Inspect e-rings, plate, spring, and rings (14) connecting the slide to the lever if needed.

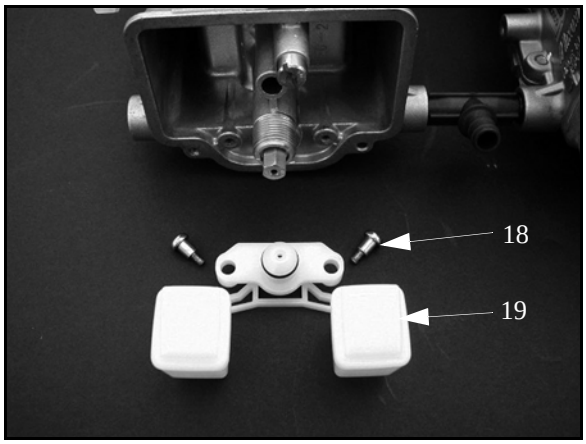


10. Remove water trap/drain plug (15) and single screw (16) on the bottom of the carburetor.
11. Remove and drain the float bowl (17).

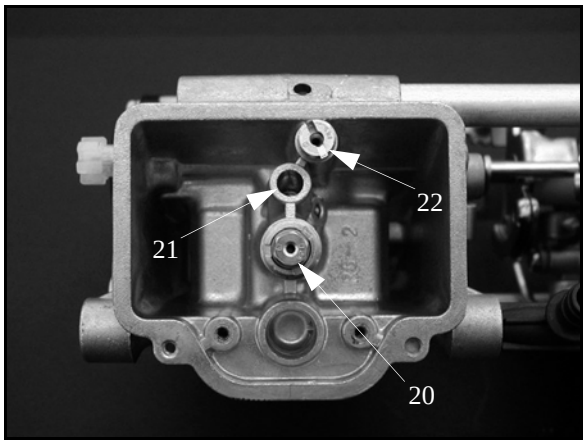
NOTE: Float bowl will not come off unless the water trap/drain plug and screw are removed.



12. Remove the two screws (18) holding the float/needle and seat assembly (19) in position and remove this assembly.
13. Inspect the contents for wear and debris.



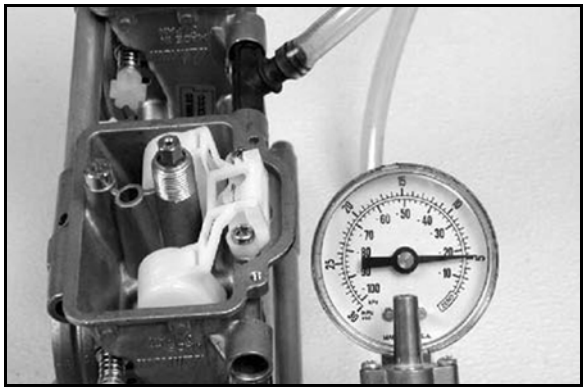
14. Remove and inspect the main jet (20), pilot jet (21), and starter jet (22). Clean them out.
15. Remove the air jet screw if so equipped.



16. Clean out all passages in carburetor body with carburetor cleaner. Dry all passages and jets with compressed air.
17. Replace gaskets and any parts that show wear or damage.
18. Repeat steps 1-18 for disassembly for the other carburetor if needed.

Assembly

1. Install the main jet (20), pilot jet (21), and starter jet (22).
2. Install float/needle & seat assembly (19).
3. Place carburetor in an inverted position.
4. Connect a pressure tester (PN 2870975) to fuel inlet fitting. Apply 5 psi pressure and observe for one minute. The needle and seat should hold pressure indefinitely. If the pressure drops, carefully inspect the needle and the needle seat. The needle can be replaced (needle supplied with float and seat).



5. Carefully inspect float bowl gasket and replace if necessary.
6. Install float bowl (16) on carburetor with water trap/drain plug (15) and single screw (16) on the bottom of the carburetor.

7. If throttle slide was removed, install throttle slide (11) so that the wider face is facing the engine side of the carburetor.
8. Install the funnel gasket (13) and funnel (12) onto the carburetor. You will have to lift the throttle slide up and place the smaller face into the funnel area.
9. Install funnel screws (10).
10. Install the e-clip (8) in the desired position on the jet needle (7).
11. Slide the plastic washer (9) on the jet needle so that it is positioned to rest on top of the throttle valve when assembled.
12. Install carburetors on engine.
13. Replace top cap gaskets (3), cover (2) and screws (1).
14. Check throttle lever free play.

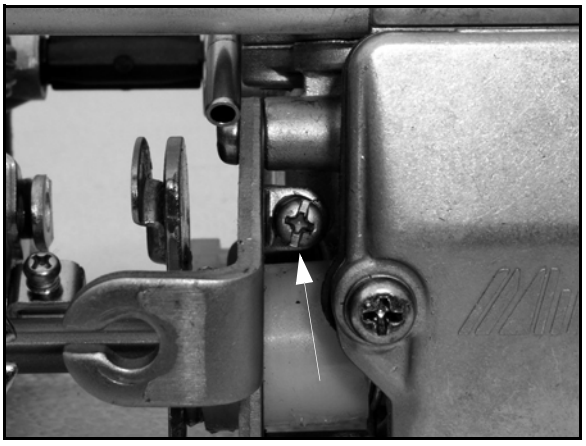
CARBURETOR ADJUSTMENT

Throttle Valve Synchronization

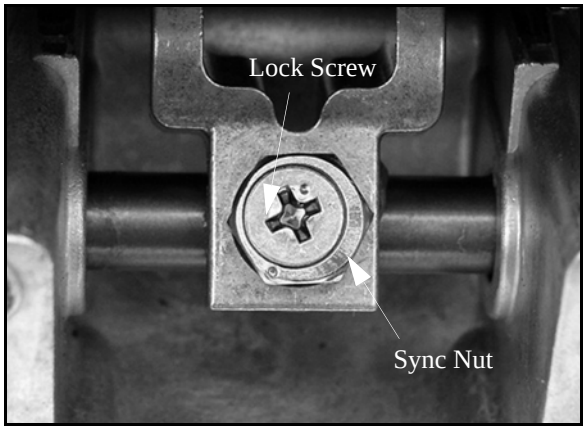
All throttle valve synchronization adjustments are made to the MAG throttle valve. The PTO throttle valve is non-adjustable and considered the base throttle valve.

Throttle valve synchronization can be performed with the carburetor rack installed or removed from the engine.

1. If running, turn off engine. Remove the air box.
2. Remove the carburetor covers.
3. Hold the throttle bell crank wide open on the carburetor.
4. The bottoms of each throttle valve should be flush with the top of the intake bores.
5. If adjustment is required, hold the PTO carburetor flush with the top of intake bore. Turn the throttle stop screw in or out to set the PTO throttle slide flush with the intake bore.



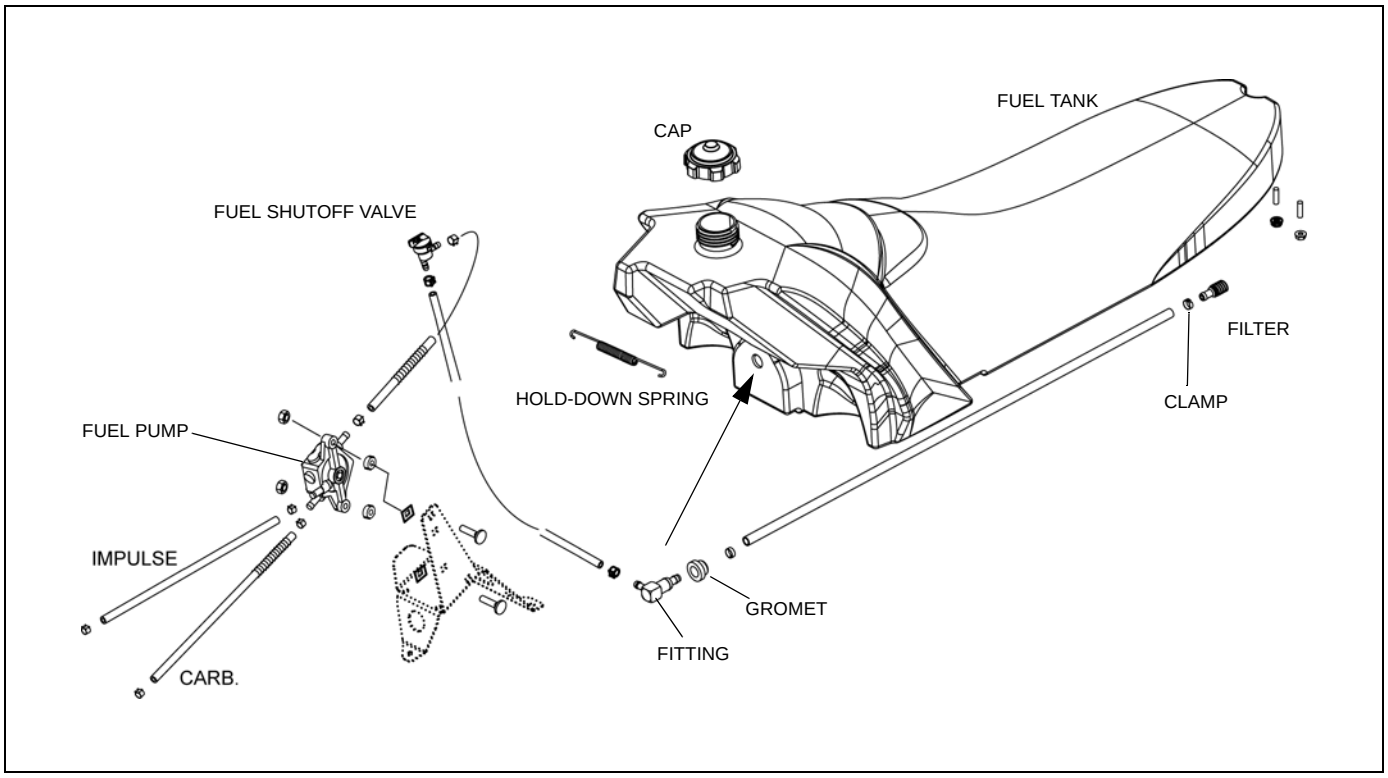
6. Once the PTO carburetor slide is flush, loosen the Phillips head screw, located under the top cover on the MAG carburetor.
7. While holding the PTO carburetor slide flush to the top of the carburetor, rotate the synchronization nut clockwise to raise the slide and counterclockwise to lower the slide.



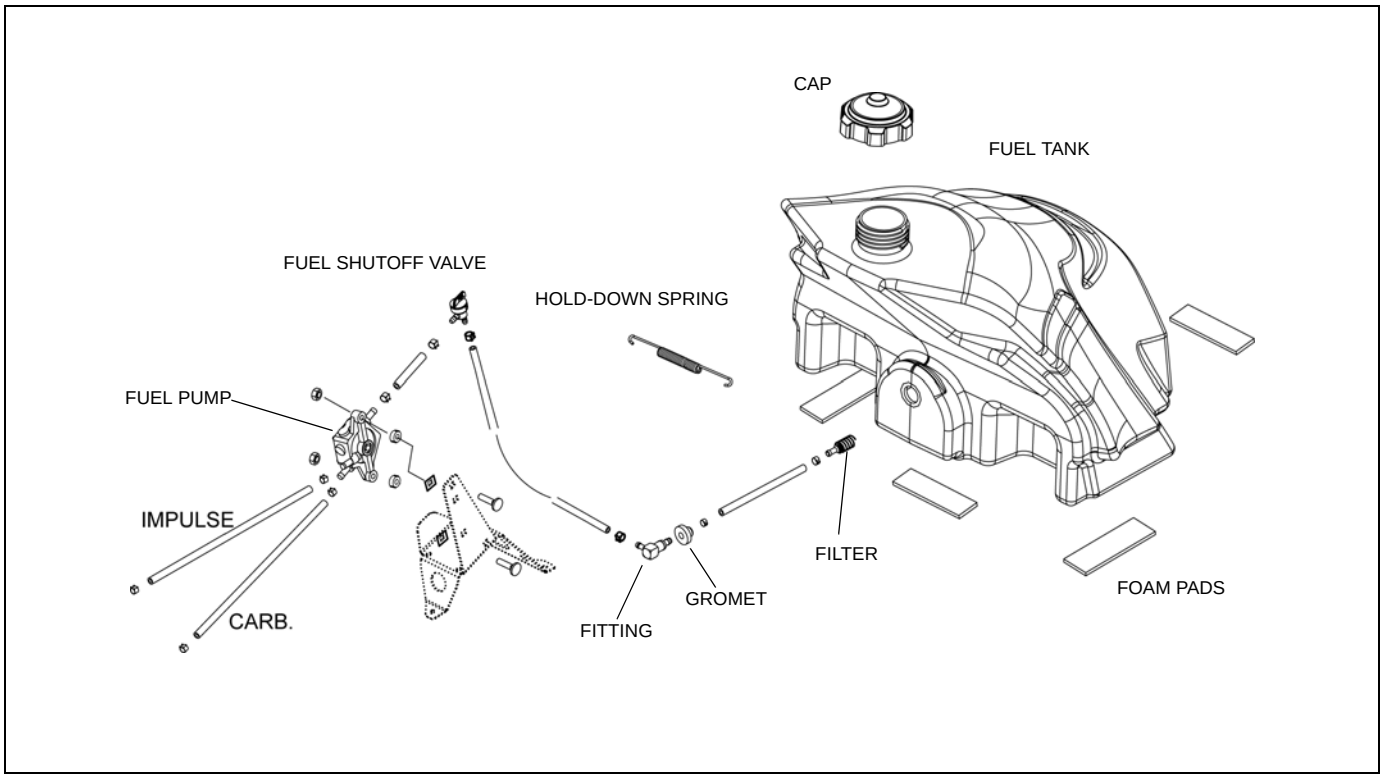
8. Adjust the synchronization nut until it is even with the PTO slide.
9. Once this is flush, lock the locking screw.
10. Replace the carburetor covers.
11. If removed, reinstall the fuel, vent, throttle, and choke hose and cable connections.
12. Verify and set throttle cable free play.

FUEL TANK

600 RR Fuel Tank Assembly

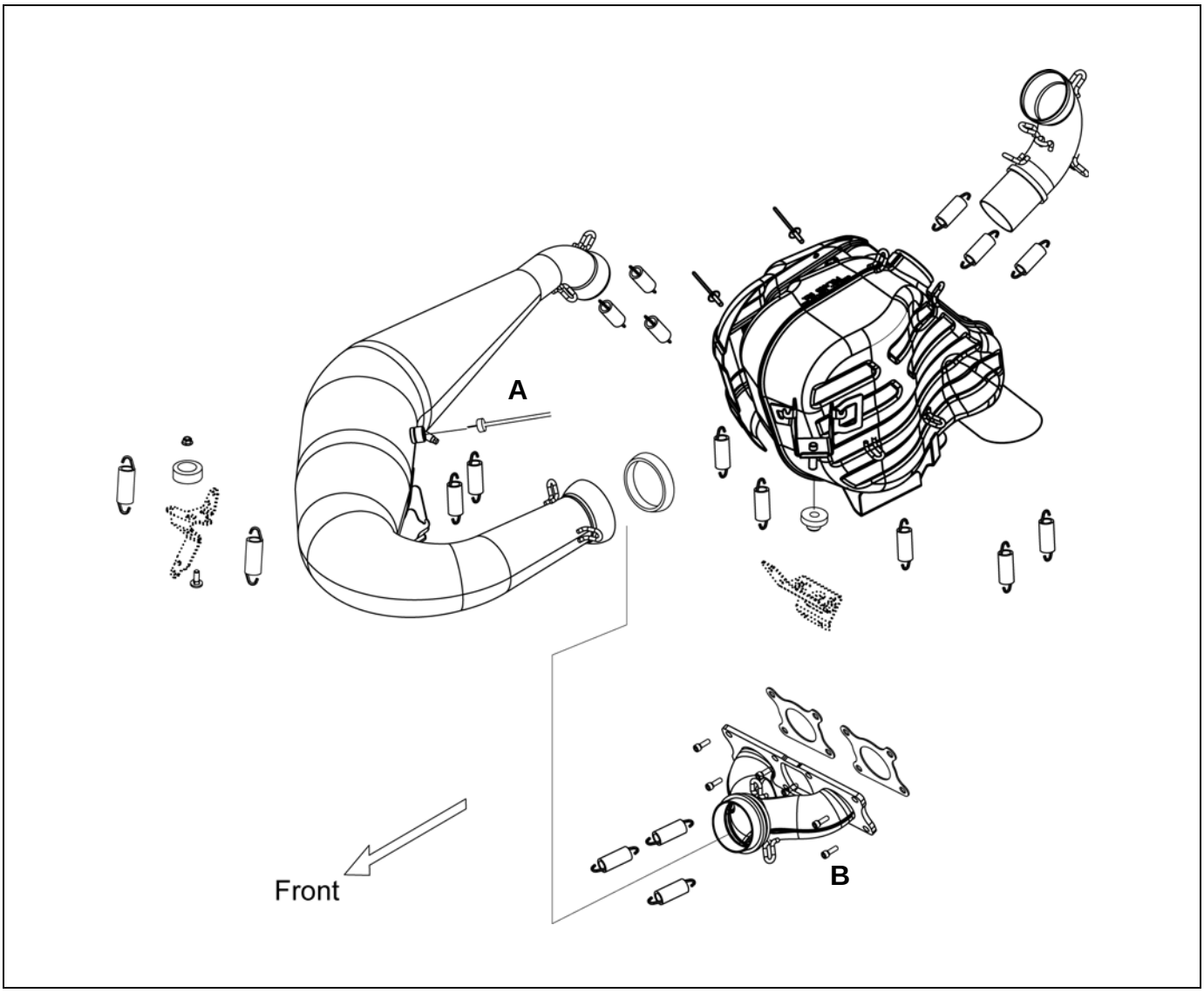


IQ 600 Racer Fuel Tank Assembly



EXHAUST SYSTEM

Pipe and Resonator Assembly



= T
A = EGT Sensor: 32 Ft.Lbs. (44 Nm) B = Exhaust Manifold Fasteners: 22 Ft. Lbs. (30 Nm)

NOTE: Always use the stainless steel (gray) springs to connect the exhaust pipe to the exhaust manifold.

CHAPTER 5

Engine and Cooling Systems

ENGINE SPECIFICATIONS 5.2
FASTENER TORQUE GUIDE 5.2
COMPONENT TORQUE SEQUENCES. 5.2
ENGINE SPECIFICATIONS 5.3
ENGINE SERVICE SPECIFICATIONS - ALL ENGINES 5.3
ENGINE INSPECTIONS 5.4
CYLINDER HEAD INSPECTION 5.4
CYLINDER MEASUREMENT. 5.4
CRANKSHAFT RUNOUT INSPECTION 5.4
PISTON INSPECTION 5.5
PISTON RING INSTALLED GAP 5.5
BEARING FIT 5.5
MAIN BEARING 5.5
CONNECTING ROD LOWER BEARING 5.6
PISTON NEEDLE BEARING 5.6
CRANKSHAFT INDEX 5.6
CHECKING CRANKSHAFT INDEX 5.7
CYLINDER HONING 5.8
HONING PROCEDURE 5.8
CLEANING THE CYLINDER AFTER HONING 5.8
CRANKSHAFT TRUING. 5.9
RECOIL ASSEMBLY 5.10
ROPE REMOVAL AND INSTALLATION 5.10
ENGINE REMOVAL AND INSTALLATION 5.11
REMOVAL 5.11
INSTALLATION 5.12
ENGINE COMPONENT ASSEMBLIES. 5.14
IQ RACER ENGINE MOUNTING. 5.14
600 RR ENGINE MOUNTING 5.15
600 RR / IQ RACER ENGINE BULKHEAD 5.16
IQ RACER CYLINDER HEAD / COVER/ CYLINDERS 5.17
IQ RACER PISTON / CRANKSHAFT. 5.18
IQ RACER RECOIL / MAGNETO. 5.19
IQ RACER CRANKCASE 5.20
600 RR / IQ RACER WATER - OIL PUMP. 5.21
600 RR CYLINDERS / CYLINDER HEAD 5.22
600 RR RECOIL / MAGNETO 5.23
600 RR PISTONS / CRANKSHAFT 5.24
600 RR CRANKCASE 5.25
VARIABLE EXHAUST SYSTEM (VES) 5.26
COOLING SYSTEMS 5.27
2008 IQ 600 RR 5.27
2008 IQ 600 RACER. 5.28
THERMOSTAT REPLACEMENT 5.29
THERMOSTAT ORIENTATION 5.29

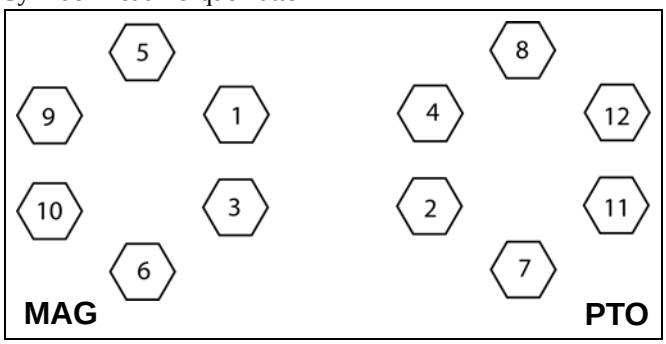
ENGINE SPECIFICATIONS

Fastener Torque Guide

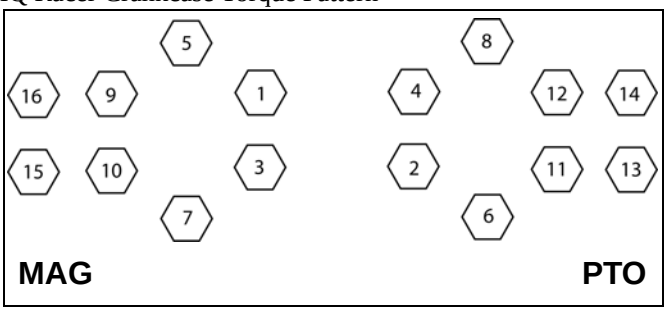
COMPONENT	IQ RACER	600 RR	NOTE
Spark Plug	18 Ft. Lbs. 24 Nm		Apply Nyogel
Head Cover	25 Ft.Lbs. 34 Nm		Loctite 242
Bleed Screw	70 In.Lbs. 8 Nm		
Knock Sensor	N/A	168 In.Lbs. 19 Nm	Clean and Dry
Temp. Sensor	18 Ft.Lbs. 24 Nm		
EV Housing EV Base	12 Ft.Lbs. 16 Nm		
EV Bellows Nut	16 Ft.Lbs. 22 Nm		
Cylinder Base Nuts	N/A	37 Ft.Lbs. 50 Nm	
Cylinder Bolts	42 Ft.Lbs. 57 Nm	N/A	
Intake Boots	9 Ft.Lbs. 12 Nm		
Exhaust Manifold	22 Ft.Lbs. 30 Nm		
Oil Pump (Cover)	7 Ft.Lbs. 9.5 Nm		
Water Pump Cover	9 Ft.Lbs. 12 Nm		
Recoil Housing	9 Ft.Lbs. 12 Nm		
Recoil Hub	9 Ft.Lbs. 12 Nm		
Flywheel Nut	90 Ft.Lbs. 122 Nm		Loctite 242
Magneto	12 Ft.Lbs. 16 Nm	5 Ft.Lbs. 7 Nm	Loctite 242
Crankcase M6 M8	 22 Ft.Lbs. 30 Nm	 9 Ft.Lbs. 12 Nm 22 Ft.Lbs. 30 Nm	Loctite 242
Engine Straps	30 Ft.Lbs. 41 Nm	45 Ft.Lbs. 61 Nm	Loctite 242
Impeller	10 Ft.Lbs. (13 Nm)		

Component Torque Sequences

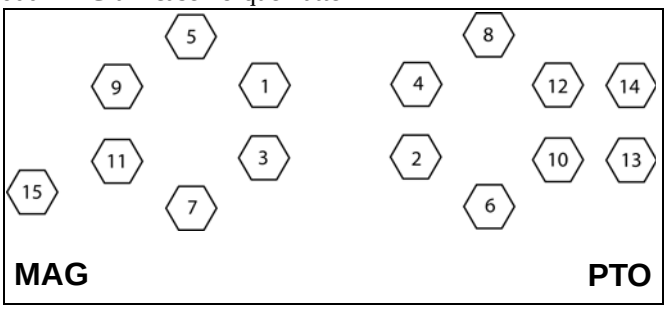
Cylinder Head Torque Pattern



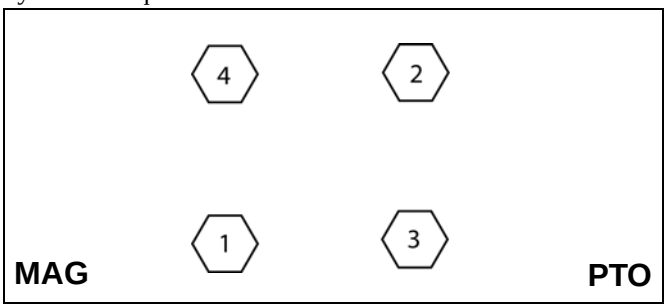
IQ Racer Crankcase Torque Pattern



600 RR Crankcase Torque Pattern



Cylinder Torque Pattern



Engine Specifications

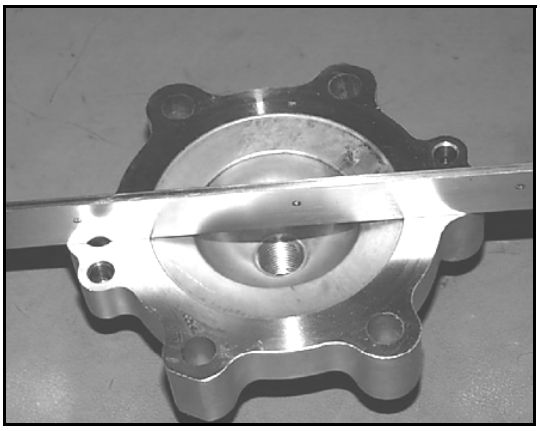
ENGINE MODEL NUMBER	INSTALLED HEAD VOLUME (CC)	HEAD SQUISH INCHES (MM)	PISTON-TO-CYLINDER CLEARANCE INCHES (MM)	PISTON RING END GAP INCHES (MM)	TRIGGER-TO-FLYWHEEL GAP (MM)
S-3649-6044-PU6F	27.6 - 28.9	.050 - .060 (1.283 - 1.544)	.004 - .006 (.105 - .159)	.014 - .020 (.36 - .508)	.4 - .8
S-3577-6044-PU6J	24 - 26	.030 - .046 (.765 - 1.16)	.0034 - .005 (.088 - .129)	.014 - .022 (.36 - .56)	.135 - 1.365

Engine Service Specifications - All Engines

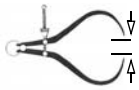
- Cylinder Head Warp Limit = .006" (.015mm)
- Cylinder Taper Limit = .002" (.051mm)
- Cylinder Out-of-Round Limit = .002" (.051mm)
- Main Bearing Interference Fit:
  RR = .001" - .002" (.026 - .051mm)
  Racer = .0014 - .0024 (.036 - .061mm)
- Connecting Rod Side Clearance = .0114" - .0295" (.289 - .749mm)
- Crankshaft Runout Deflection Limit = .0025" (.07mm)

ENGINE INSPECTIONS

Cylinder Head Inspection



Using a flat bar and a feeler gauge, inspect each cylinder head for warping. Replace head if warping exceeds .003" (.08mm).

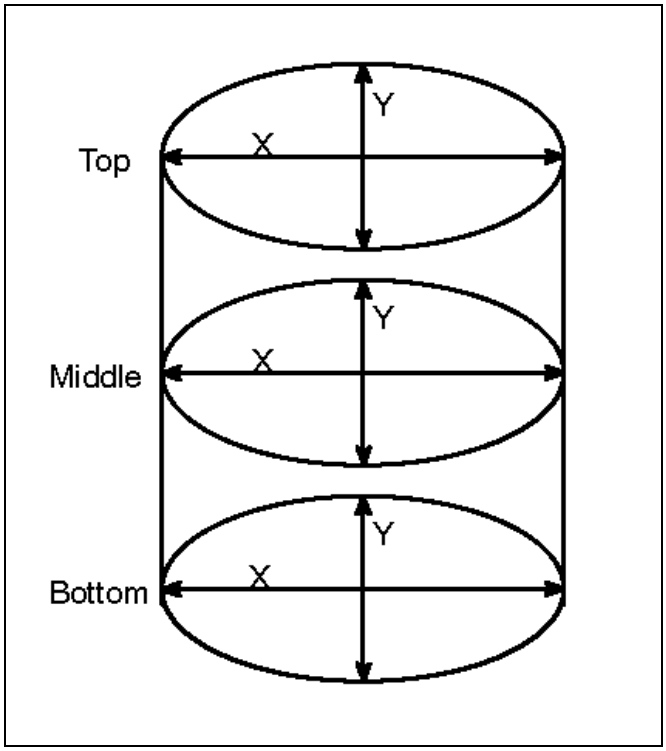
 = In. / mm.
Cylinder Head Warp Limit .006" (.015mm)

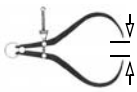
Cylinder Measurement

Inspect each cylinder for wear, scratches, or damage. If no damage is evident, measure the cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure the bore 1/2" from the top of the cylinder; in line with the piston pin and 90° to the pin to determine if the bore is out of round. Repeat the measurements at the middle and bottom of the cylinder. Use the chart below and record all measurements.

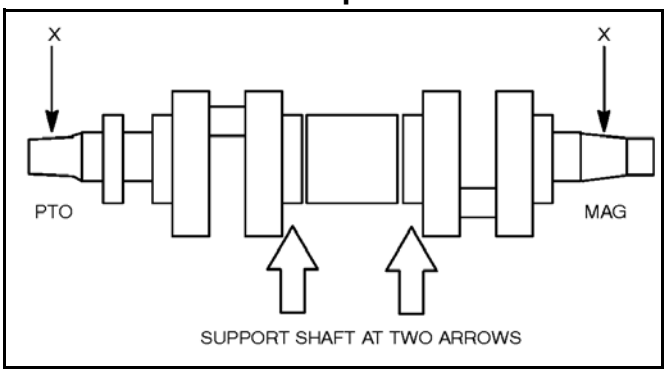
Cylinder Measurement Worksheet

TOP	
X	Y
MIDDLE	
X	Y
BOTTOM	
X	Y
Out-of-Round = Top X - Top Y and Bottom Y - Bottom X	
Taper = Top Y - Bottom Y and Top X - Bottom X	



 = In. / mm.
Taper Limit = .002" (.051mm) Out-of-Round Limit = .002" (.051mm)

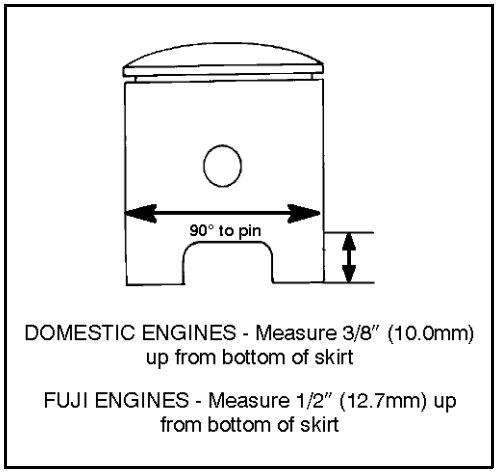
Crankshaft Runout Inspection



1. Support the crankshaft in a set of “V” blocks as shown.
2. Use a dial indicator to measure the runout at the following locations:
   - PTO end = First taper after bearing flat.
   - MAG end = 1/2" from bearing flat.
3. Runout deflection cannot exceed .0025" (.07mm).
4. If the runout deflection exceeds the maximum specification, crankshaft trueing may correct the deflection.

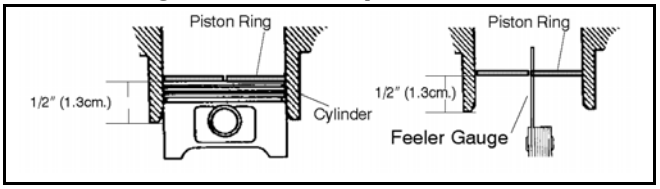
Piston Inspection

Check piston for scoring or cracks in piston crown or pin area. Excessive carbon buildup below the ring lands is an indication of piston, ring or cylinder wear. On Fuji engines, measure piston outside diameter at a point that is 1/2" (12.7mm) up form the bottom of the skirt at a 90° angle to the direction of the piston pin.



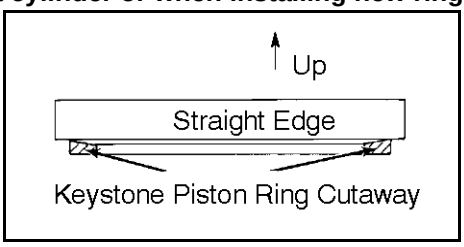
Subtract this measurement from the minimum cylinder measurement (90° to the pin). If clearance exceeds the service limit, the cylinder should be re-bored (replaced if Nicasil-lined) and new pistons and rings installed.

Piston Ring Installed Gap



Position the ring 1/2" (1.3 cm) from the top of the cylinder using the piston to push it squarely into place. Measure installed gap with a feeler gauge at both the top and bottom of the cylinder.

NOTE: A difference in end gap indicates cylinder taper. The cylinder should be measured for excessive taper and out-of-round. Replace rings if the installed end gap exceeds the service limit. Always check piston ring installed gap after re-boring a cylinder or when installing new rings.



Piston rings are installed with marking or beveled side up.

Bearing Fit

Any time crankshaft bearing failure occurs and the case is reused, check the bearing fit into the case halves using the following procedure.

With case halves cleaned, press a replacement bearing into each of the main bearing journals to determine a basic amount of press fit.

Do a comparison check of all journals by manually forcing the bearing into the bearing seats noting if any are noticeably loose or tight. Normal hand installation will be an indication of the recommended interference fit. If the bearing falls out of the case when the case is inverted, or if the crankcase bearing surface is severely galled or damaged, the crankcase assembly should be replaced.

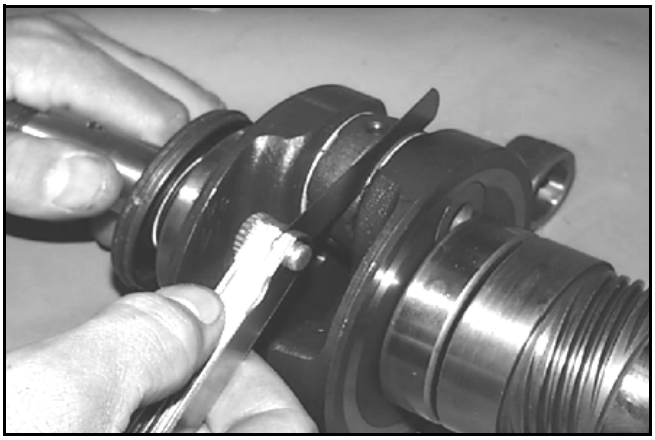
Main Bearing Interference Fit:
RR = .001" - .002" (.026 - .051mm)
Racer = .0014 - .0024 (.036 - .061mm)

Main Bearing

Clean crankshaft thoroughly and oil main and connecting rod bearings with Polaris engine oil. Carefully check each main bearing on the crankshaft.

Due to extremely close tolerances, the bearings must be inspected visually and by feel. Look for signs of discoloration, scoring or galling. Turn the outer race of each bearing. The bearings should turn smoothly and quietly. The inner race of each bearing should fit tightly on the crankshaft. The outer race should be firm with minimal side to side movement and no detectable up and down movement. Replace any loose or rough bearings.

Connecting Rod Lower Bearing



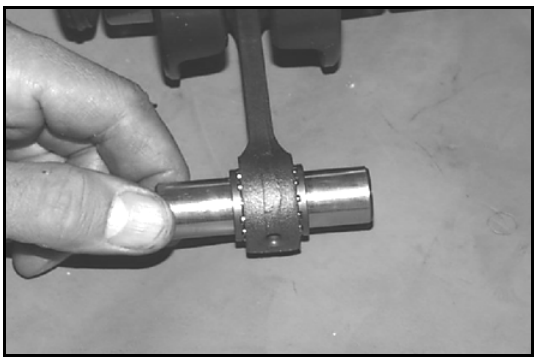
Measure connecting rod big end side clearance with a feeler gauge on both sides of the connecting rod. The side clearance on either side of the connecting rod cannot exceed the connecting rod side clearance specification. The difference between the two clearance measurements cannot exceed the maximum clearance differential specification.

= In. / mm.
Connecting Rod Side Clearance: .012"-.016" (.30-.40mm) Maximum Clearance Differential .002" (.051mm)

Rotate the connecting rod on the crankshaft and feel for any rough spots. Check radial end play in rod by supporting rod against one thrust washer and alternately applying up and down pressure. Replace bearing, pin, and thrust washers if side clearance is excessive or if there is any up and down movement detectable in the big end bearing.

Piston Needle Bearing

1. Clean the end of the connecting rod and inspect inner bore with a magnifying glass. Look for any surface irregularities including pitting, wear, or dents.
2. Run a fingernail around the inside of the rod and check for rough spots, galling, or wear.
3. Oil and install needle bearing and pin in connecting rod.
4. Rotate pin slowly and check for rough spots or any resistance to movement.
5. Slide pin back and forth through bearing while rotating and check for rough spots.



6. With pin and bearing centered in rod, twist ends back and forth in all directions to check for excessive axial play.
7. Replace pin and bearing if there is any resistance to rotation or excessive axial or radial movement. If play or roughness is evident with a new pin and bearing, replace the connecting rod.

Crankshaft Index

Polaris crankshafts are pressed together. The connecting rod journal center lines are indexed 180° apart from each other.

It is sometimes necessary to check multi-cylinder crankshafts to verify that one cylinder has not been forced out of position relative to the other cylinder. Some causes for a “out of index” crankshaft include but are not limited to the following:

- Hydrolock from water or fuel
- Impact to drive clutch from object or accident
- Abrupt piston or other mechanical failure
- Engine lock-up due to drive belt failure

Symptoms of an out of index crankshaft can include but are not limited to the following:

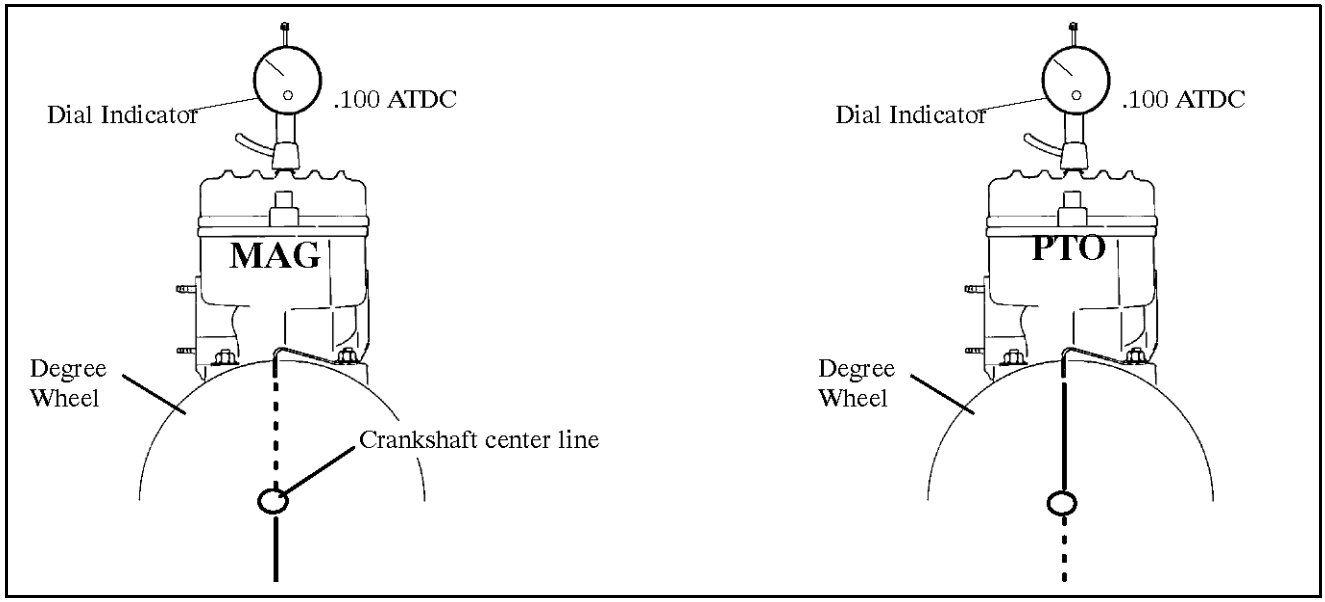
- Difficulty calibrating carburetor (repetitive plug fouling on one cylinder with no other cause)
- Unexplained piston failure on one cylinder (i.e. severe detonation, broken ring lands, etc.)
- Excessive vibration of engine, back-firing, etc.
- Rough idle, poor top speed.

Checking Crankshaft Index

1. Remove the drive belt and drive clutch.
2. Securely fasten a large degree wheel on the flywheel or PTO end of the crankshaft. Make sure that it is mounted concentrically with the crankshaft center line.
3. With a section of wire (wire coat hanger), anchor it to a convenient spot. Bend one end at the outer perimeter of the degree wheel as shown below.
4. Install a dial indicator into the magneto end cylinder spark plug hole. The ignition timing is referenced by the magneto end.
5. Locate TDC as accurately as possible by finding the center of the point where there is no piston movement note the “Zero” the dial indicator at this point.
6. Continue to rotate the crankshaft in the normal direction of rotation until the dial indicator reads .100" (2.54mm) after top dead center (ATDC).
7. Bend the pointer or move the degree wheel until the pointer aligns with a 180° mark on the degree wheel.
8. With the pointer aligned, make sure the degree wheel and pointer are secured and will not move out of position. Re-check accuracy of this location a few times. The pointer should align with the 180° mark when the dial indicator reads .100” (2.54mm) ATDC.

NOTE: Do not move the crankshaft, degree wheel or pointer after the initial setting on the MAG end cylinder - simply read the wheel and dial indicator.

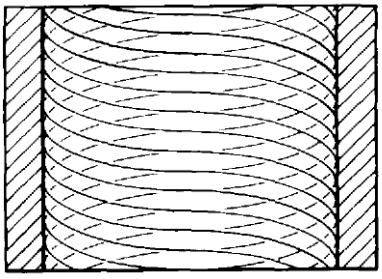
9. Remove the dial indicator and install in PTO cylinder. Repeat finding TDC process. Note the degree wheel indication when the dial indicator reads .100" ATDC. It should be 180° (+/-2°) from the MAG cylinder mark.



Cylinder Honing

The cylinder bore must be de-glazed whenever new piston rings are installed. A light honing with fine stones removes only a very small amount of material. A proper crosshatch pattern is important to provide a surface that will hold oil, and allow the rings to seat properly. If the crosshatch is too steep, oil retention will be reduced. A crosshatch angle which is too shallow will cause ring vibration, poor sealing, and overheating of the rings due to blow-by and reduced contact with the cylinder wall. Service life of the pistons and rings will be greatly reduced.

NOTE: A Nicasil cylinder can be lightly honed with a soft stone hone but an not be oversized.



EXAMPLE OF A CROSS HATCH PATTERN

Honing Procedure

1. Wash the cylinder with cleaning solvent.
2. Clamp the cylinder in a soft jawed vise by the cylinder studs.
3. Place hone in cylinder and tighten stone adjusting knob until stone contacts the cylinder walls (DO NOT OVERTIGHTEN). Cylinders may be wet or dry honed depending on the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore. Using a .50" (13 mm) drill motor rotating at a speed of 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered to prevent edge loading and always bring the stone approximately .5" (1.2 cm) beyond the bore at the end of each stroke.
4. Release the hone at regular intervals to inspect bore size and finish.

Cleaning The Cylinder After Honing

It is very important that the cylinder be thoroughly cleaned after honing to remove all grit material. Wash the cylinder in a solvent, then in hot soapy water. Pay close attention to areas where the cylinder sleeve meets the aluminum casting (transfer port area). Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with Polaris Premium 2 Cycle Lubricant.

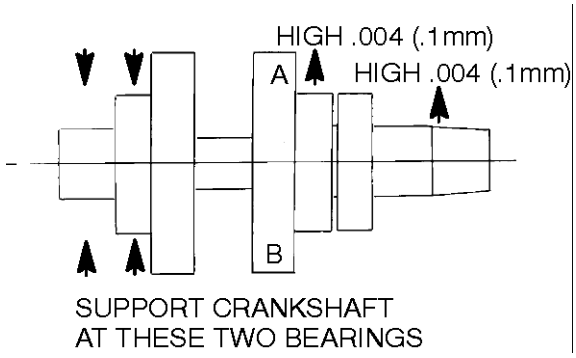
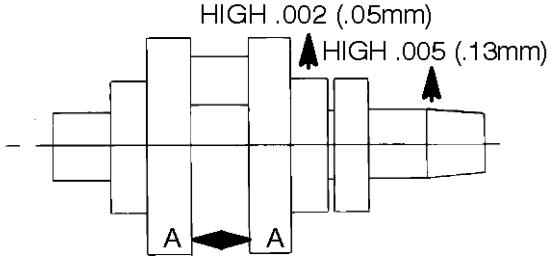
NOTE: Always check piston to cylinder clearance and piston ring installed gap after honing or boring is complete.

Crankshaft Truing

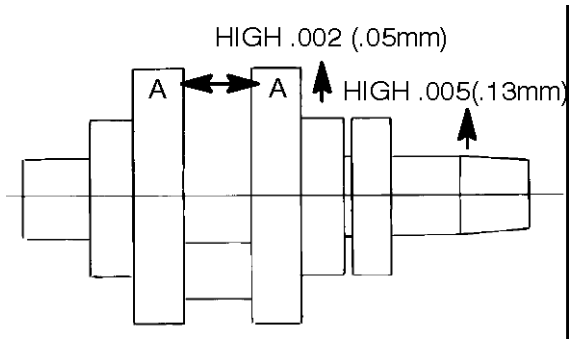
Lubricate the bearings and clamp the crankshaft securely in the holding fixture. If truing the crankshaft requires striking with a hammer, always be sure to re-check previously straightened areas to verify truing. Refer to the illustrations below. Use Crankshaft alignment kit PN 2870569.

NOTE: The rod pin position in relation to the dial indicator tells you what action is required to straighten the shaft.

Truing Examples

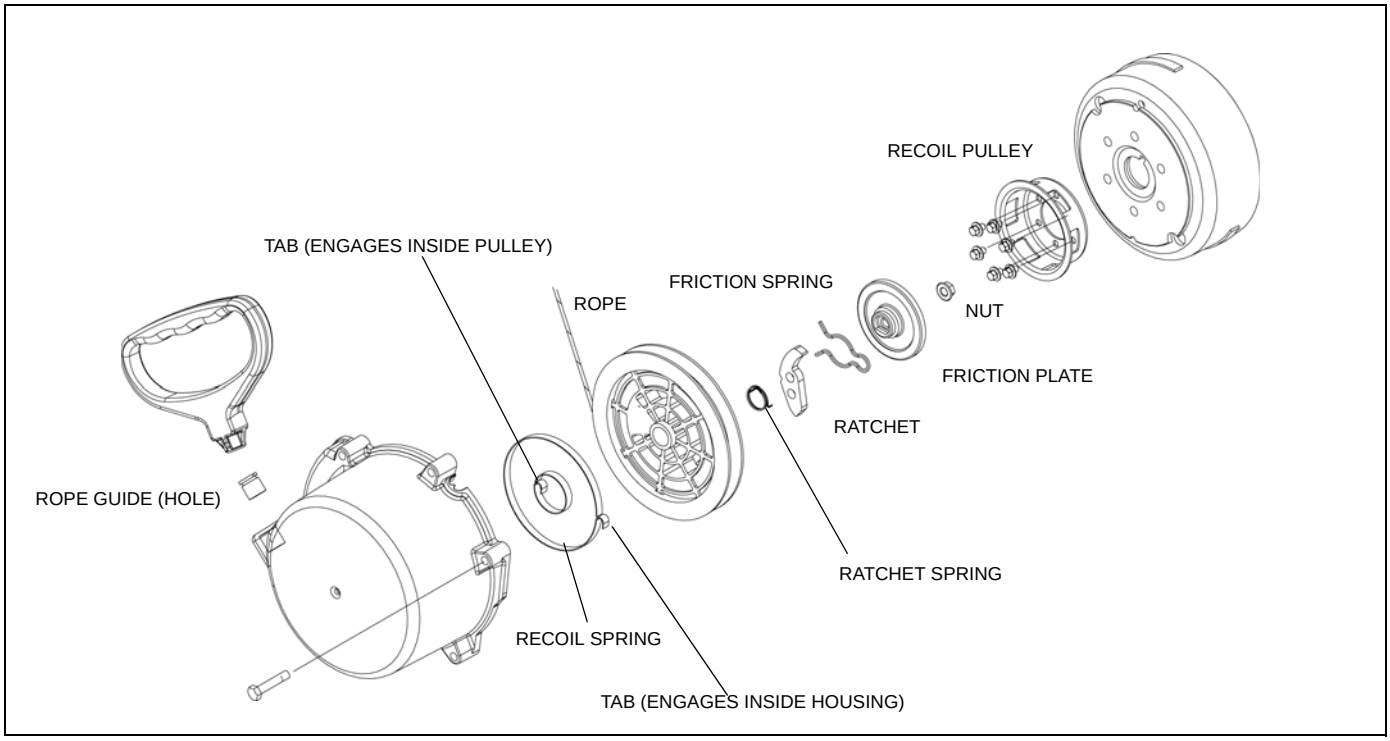
To correct a situation like this. Strike the shaft at point A with a brass hammer.	
To correct a situation like the one shown in this. Squeeze the crankshaft at point A. You will use the tool from the alignment kit PN 2870569.	

Truing Examples

If the crank rod pin location is 180° from the dial indicator (opposite of above), it will be necessary to spread the crankshaft at the A position as shown in illustration 3. When rebuilding and straightening a crankshaft, straightness is of utmost importance. Runout must be as close to zero as possible.	

RECOIL ASSEMBLY

Rope Removal and Installation



⚠ CAUTION

Recoil spring under high tension. Always wear eye protection when working with recoil housing components.

1. With the recoil housing removed from the engine, un-tie any knots (handle) in the recoil rope and allow the pulley to slowly unwind.
2. Remove the nut, friction plate, friction spring, ratchet and ratchet spring from the pulley.
3. Lift the pulley straight out of the housing making sure the spring is no longer connected to the backside of the pulley.

NOTE: If all of the recoil spring tension was removed, the spring should stay inside the housing when the pulley is removed.

4. Inspect all components for signs of abnormal wear and tear. Replace components as required. If replacing the rope, tie a small square knot at one end. Push the knot firmly into the pocket on the pulley.
5. If the pulley recoil spring was removed during disassembly, install the spring by spiraling the spring counterclockwise toward the center of the housing.
6. Lubricate the center shaft and spring with Premium grease.
7. Wind the rope counterclockwise around the pulley as viewed from the ratchet-side of the pulley.
8. Pass the end of the rope through the hole in the housing. If the rope guide was removed from the housing, reinstall it before attaching the rope handle.
9. Slide the pulley down the center shaft and into the housing making sure the recoil spring re-engages the pulley tab.
10. Install the ratchet spring and ratchet into the pulley face. The ratchet spring leg fits in the notch on the ratchet and holds the ratchet in (retracted).
11. Install friction spring with one leg inserted in the bottom hole on the ratchet.
12. Install nut and torque to 5 ft.lbs. (7 Nm).
13. Pull rope out to its full extension and align pulley notch with rope hole in housing.
14. Using a needle nose pliers or hooked wire, pull a loop of rope through the notch in the pulley.
15. Prevent the rope from being retracted by tieing a knot in the rope on the outside of the housing at the rope guide hole.
16. Wind the recoil pulley counterclockwise until the spring begins to bind. Unwind the pulley clockwise two revolutions.
17. Pull on the rope to disengage it from the notch in the pulley. Un-tie the knot in the rope and allow it to retract into the housing.
18. Pull on the handle to verify proper operation.

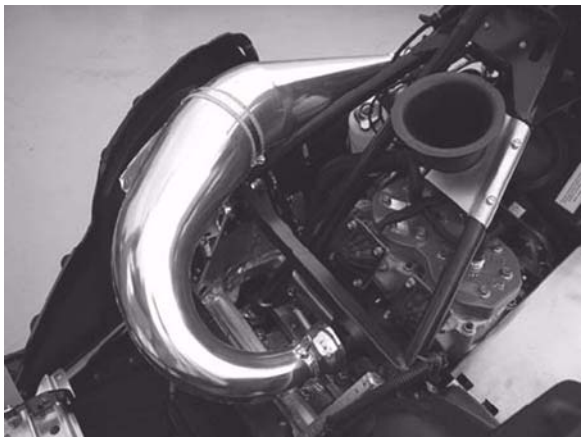
ENGINE REMOVAL AND INSTALLATION

Removal

1. Remove the hood and side panels.
2. Disconnect the exhaust pipe sensor and remove the exhaust system.
3. Turn the fuel valve to OFF.
4. Remove the drive belt.
5. Remove the drive and driven clutches.

NOTE: Keep track of the spacers that are on the jackshaft (behind the driven clutch).

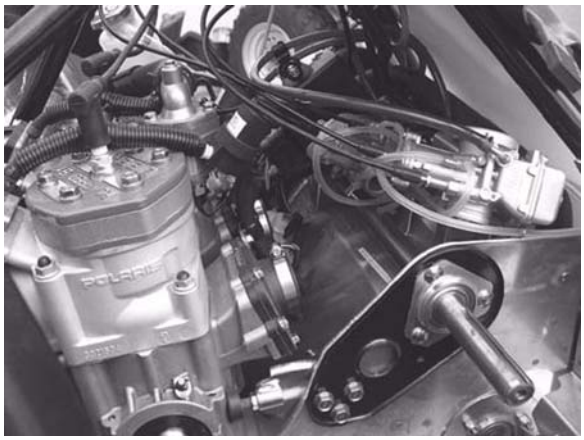
6. Remove the intake horn and the brace from the chassis.



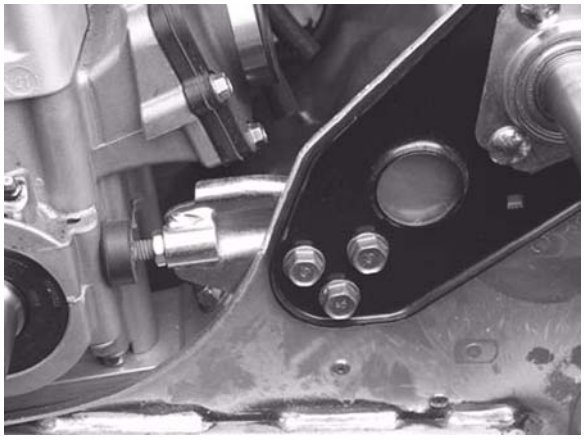
7. Remove the air box.
8. Remove the exhaust system.

NOTE: Grey colored springs are located on the header pipe and should be replaced in the same area.

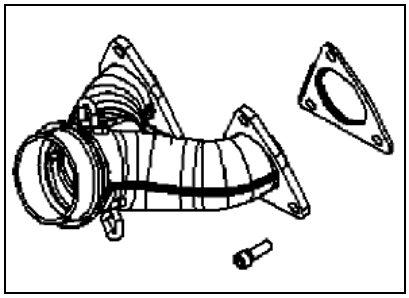
9. Separate the carburetors from the intake boots and secure it out of the way.



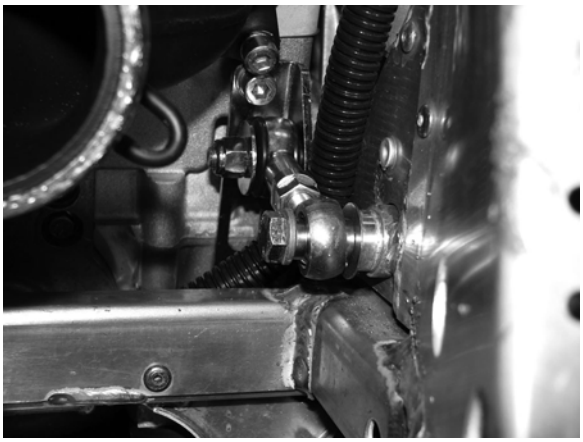
10. Remove the rear engine torque stop.



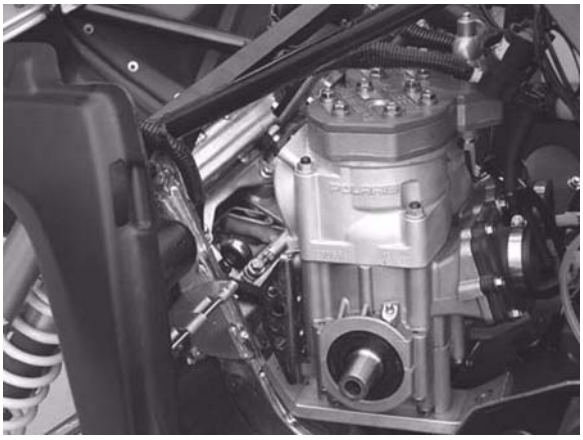
11. Remove the manifold.



12. Remove the fastener that holds the torque stop to the engine plate.



13. Disconnect the spark plugs.
14. Drain all coolant from the engine.
15. Remove the lower center front cooling hose.
16. Remove the hose from the top of the thermostat.
17. Disconnect the impulse line from the crankcase.
18. Remove the recoil handle and secure the recoil rope.
19. Disconnect the EV solenoid, water pump sensor, regulator rectifier and stator connections.
20. Remove the PTO EV assembly from the engine.

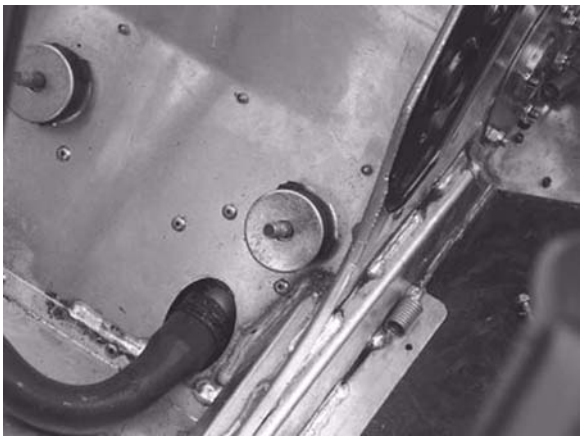


21. Remove the front motor mount fasteners and washers.
22. Remove the rear motor mount fasteners.
23. Remove the engine from the clutch side of the chassis.

Installation

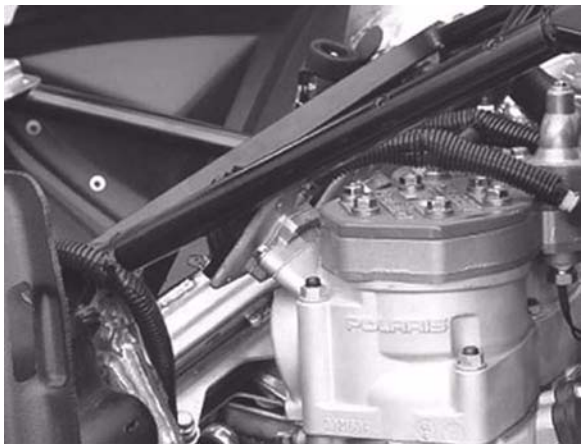
The following instructions is for an engine that is assembled with the engine mounting plates attached and the spark plugs and PTO EV assembly removed.

NOTE: Install the large flat washers onto the rear motor mounts before proceeding.



1. From the clutch side, place the engine into the chassis and onto the motor mounts.

2. Apply Loctite 242 to the threads of each base fastener on the PTO EV and torque to specification.

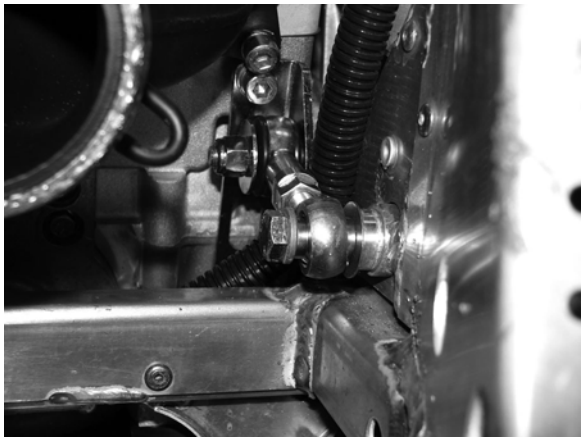


= T
EV Base: 12 ft-lb (16Nm)

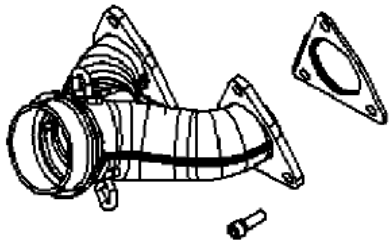
3. Place the washers and nuts on to the front and rear motor mounts.
4. Torque the motor mounts to specification.

= T
Motor Mount Torque: 28 ft-lb (38Nm)

5. Connect the electrical items.
6. Connect the impulse line to the crankcase.
7. Route the recoil rope to the correct position.
8. Replace the hose to the thermostat housing.
9. Replace the lower center front cooling hose.
10. Connect he spark plug leads.
11. Replace the front torque arm to the engine plate and route the harness wires in a secure place.



12. Replace the manifold and torque the mounting fasteners to specification.



= T
Manifold Fastener Torque: 22 ft-lb (30 N-m)

13. Replace the rear torque stop plate and torque the fasteners to specification.

= T
Rear Torque Stop Plate Torque: 28 ft-lb (38N-m)

14. Adjust the torque stop so that it is touching but not forcing on the engine.
15. Place the carburetor back onto the intake boots and tighten the hose clamps to secure the carburetors.
16. Place the air box into the chassis.
17. Place the air intake horn onto the airbox and secure it to the chassis.
18. Replace the drive clutch and torque to specification.

= T
Drive Clutch Torque: 50 ft-lb (69N-m)

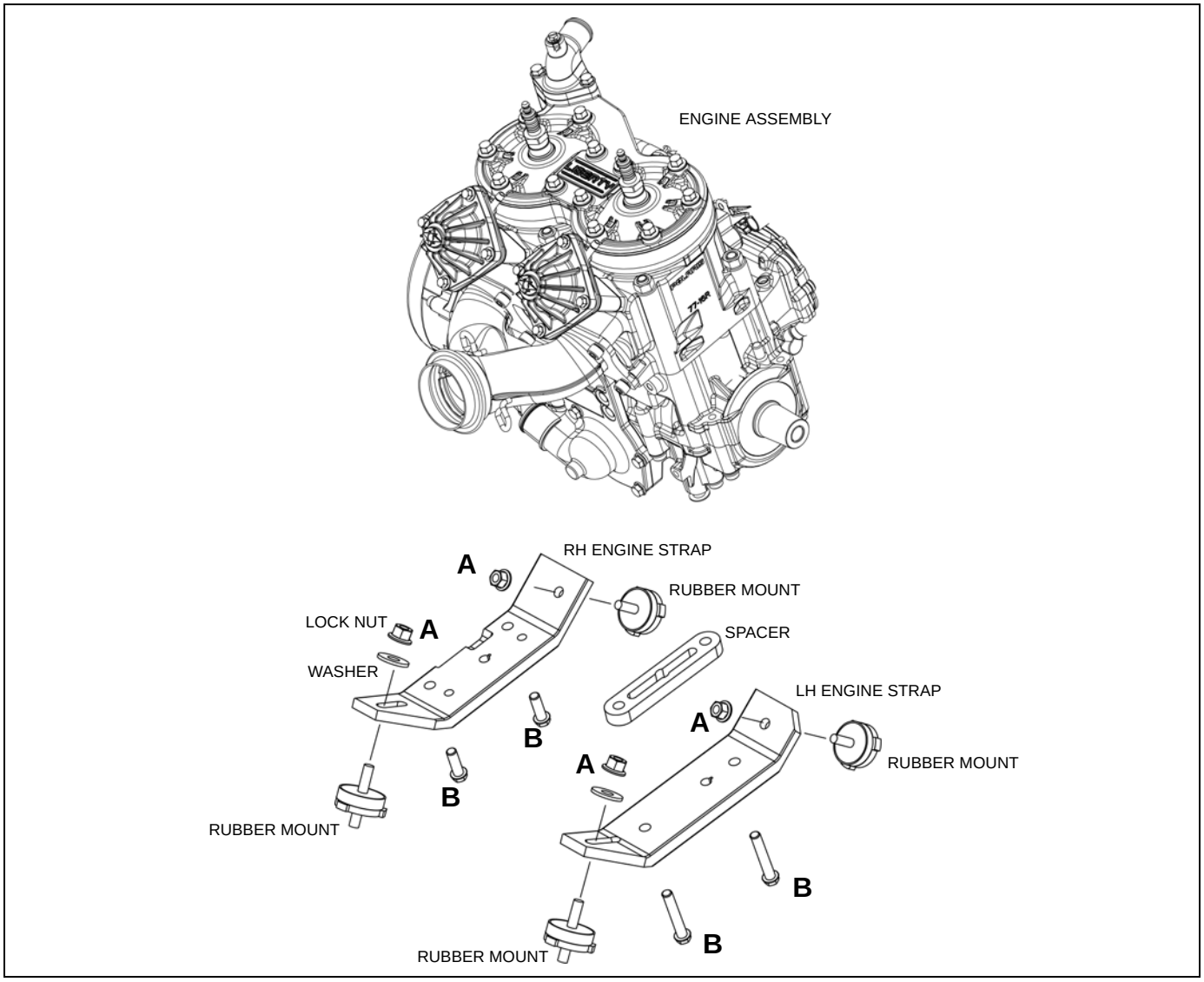
19. Place the driven clutch spacers on to the jackshaft.
20. Place the driven clutch on to the jackshaft and torque to specification.

= T
Driven Clutch Torque: 12 ft-lb (17N-m)

21. Verify clutch alignment.
22. Re-install the drive belt.
23. Replace the belt cover.
24. Replace the side panels.
25. Replace coolant and bleed the cooling system.
26. After test running, re-torque the drive clutch bolt.

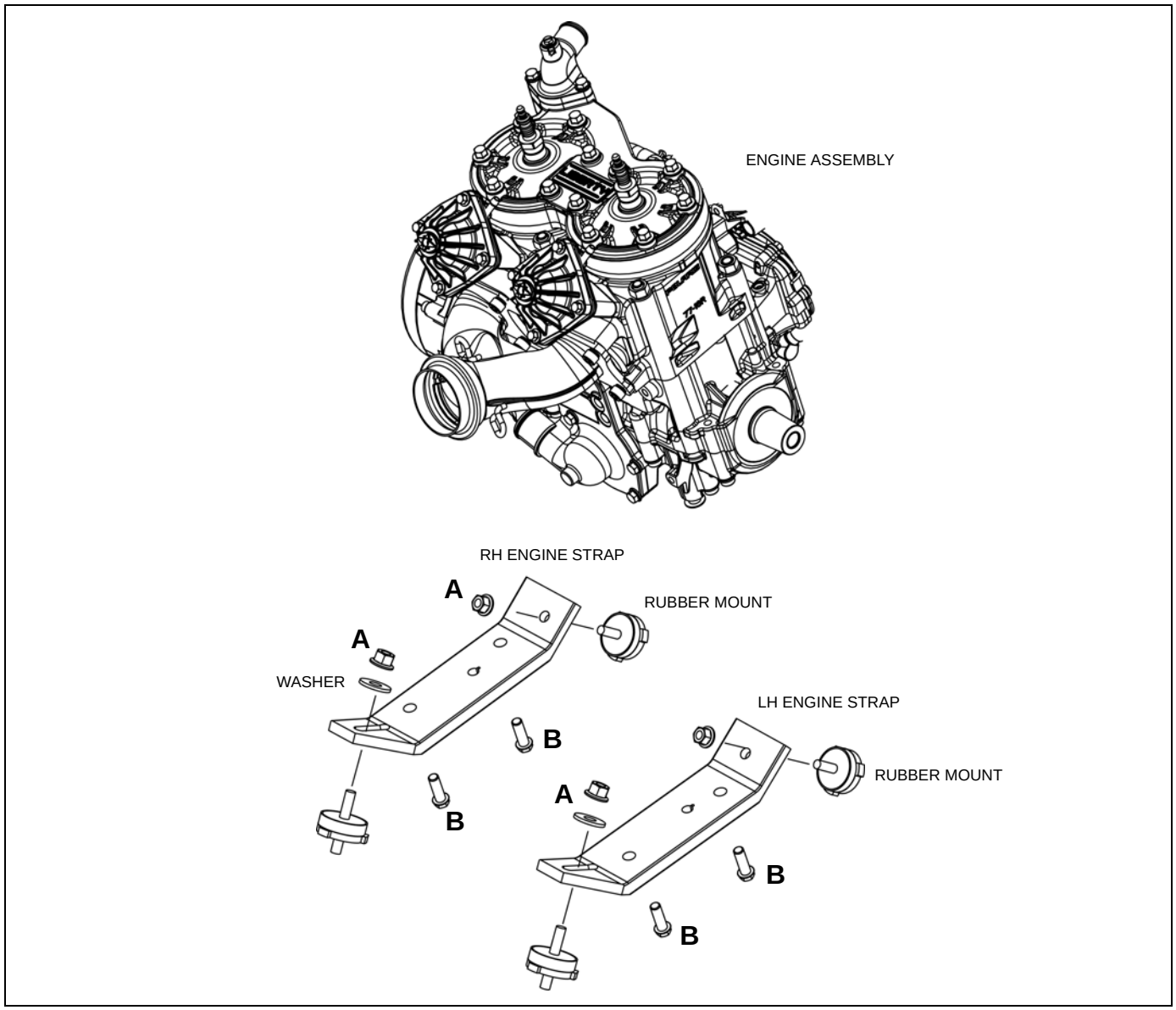
ENGINE COMPONENT ASSEMBLIES

IQ Racer Engine Mounting



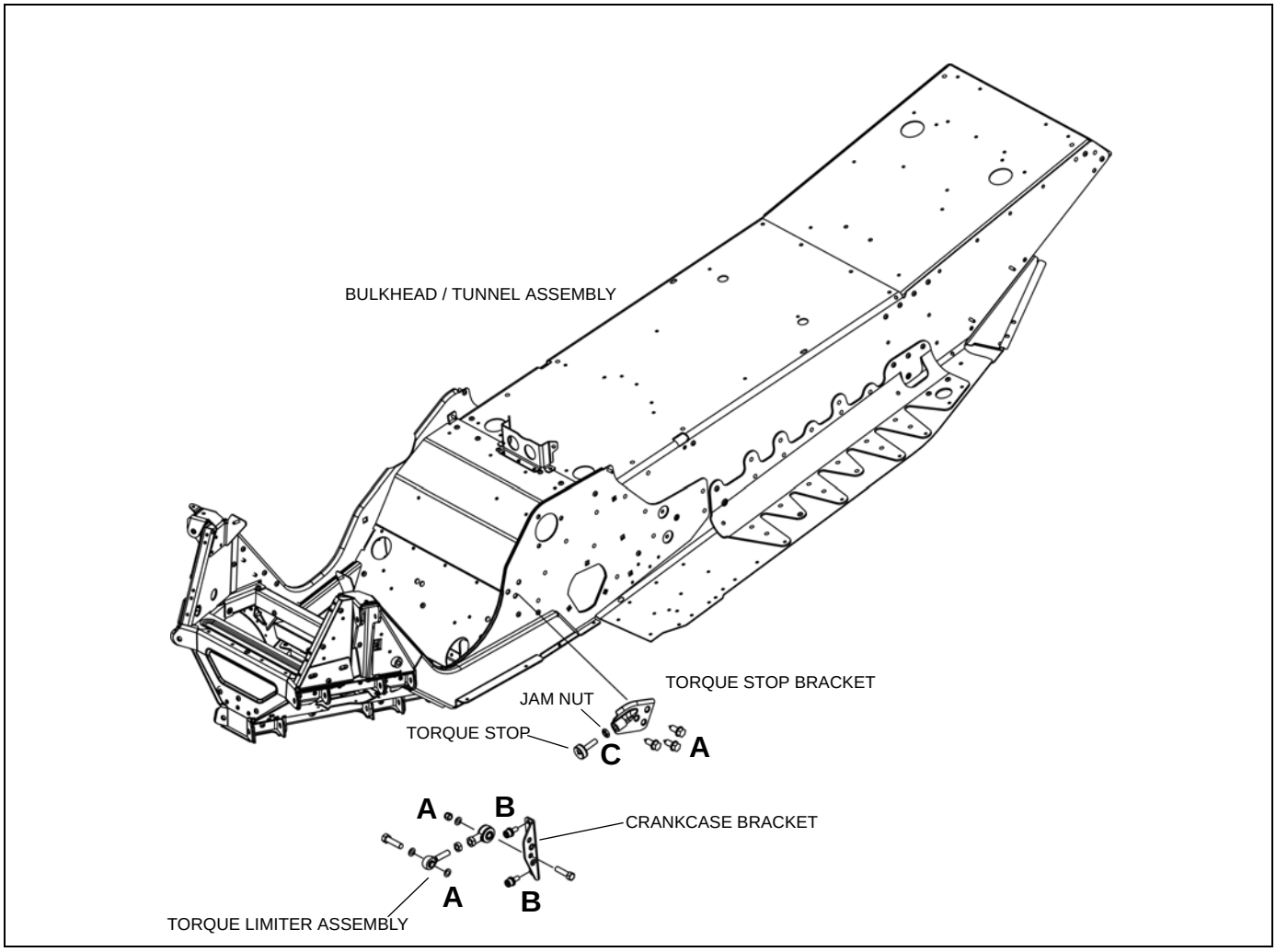
= T
A = 28 Ft.Lbs. (38 Nm) B = 30 Ft.Lbs. (41 Nm) - Apply Loctite 242

600 RR Engine Mounting



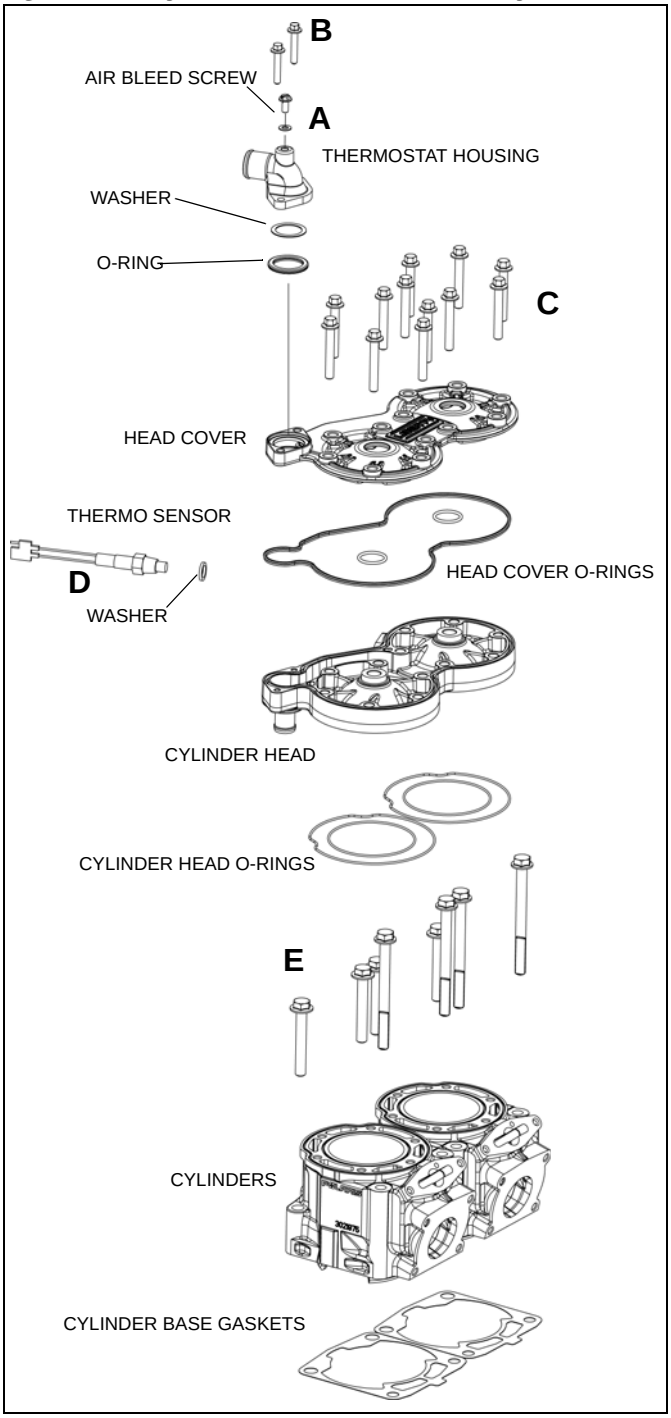
= T
A = 28 Ft.Lbs. (38 Nm) B = 30 Ft.Lbs. (41 Nm) - Apply Loctite 242

600 RR / IQ Racer Engine Bulkhead



= T
A = 28 Ft.Lbs. (38 Nm) B = 18 Ft.Lbs. (24 Nm) C = 15 Ft.Lbs. (20 Nm)

IQ Racer Cylinder Head / Cover/ Cylinders



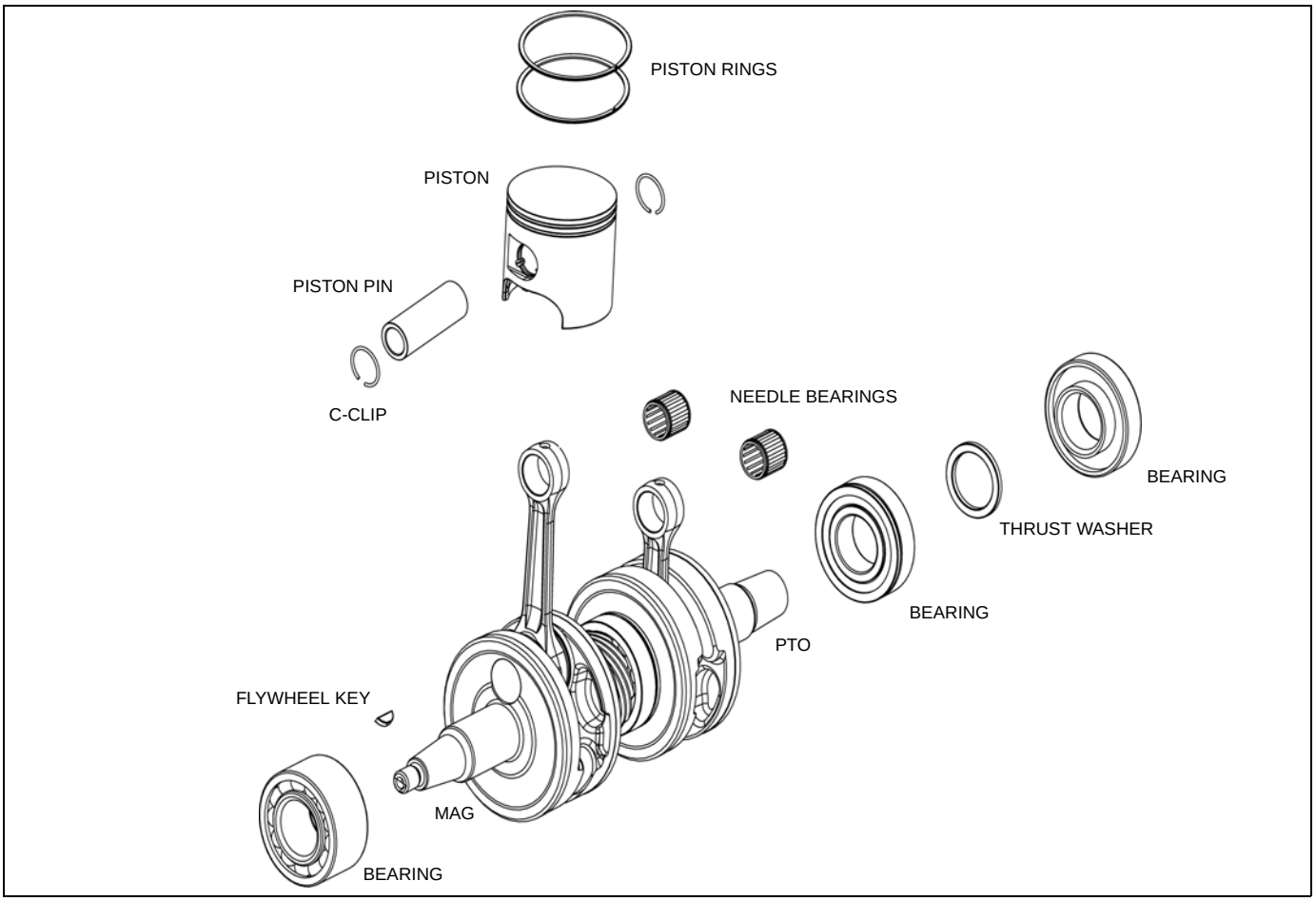
= T

A = 70 In.Lbs. (8 Nm)
B = 9 Ft.Lbs. (12 Nm) - Apply Loctite 242
C = 25 Ft.Lbs. (34 Nm) - Apply Loctite 242
D = 18 Ft.Lbs. (24 Nm) - Apply Pipe Sealant
E = 42 Ft.Lbs. (57 Nm)

Disassembly / Assembly Process

1. Remove the coolant from the engine using a siphon, wet/ dry vac, or drain pan.
2. Remove the air box, exhaust pipe and resonator from the engine compartment.
3. Remove the high tension wires and spark plugs from the cylinder head.
4. Remove the thermostat housing outlet cooling hose from the housing.
5. Loosen all, then remove all head cover fasteners. Clean the fastener threads to remove any thread locking residue.
6. Discard the head cover and cylinder head o-rings. Always use new o-rings during assembly.
7. Inspect the cylinder head / combustion domes for any damage. Measure cylinder head flatness. Replace cylinder head if required.
8. Loosen all, then remove the cylinder bolts. Clean the bolt threads to remove any thread locking residue.
9. Carefully pull each cylinder upwards taking care not to drop the piston and rod abruptly against the crankcase.
10. Remove the cylinder base gaskets. Use a gasket scraper to clean the gasket residue from the crankcase and cylinder bases.
11. Inspect the cylinder walls. Nicasil cylinders can only be lightly honed. Damage that cannot be removed with a light hone requires cylinder replacement or re-chroming.
12. The assembly process is the reverse of disassembly.
13. Always use new gaskets and o-rings during assembly. Liberally coat the inside of each cylinder and the outside of each piston with Polaris two-stroke engine oil.
14. When installing a piston into a cylinder, verify each piston ring opening is located at each piston ring locating pin. Squeeze the top ring, then carefully slide the cylinder over the compressed ring. Do the same with the bottom ring.
15. Follow the torque specifications and torque sequences located at beginning of chapter when tightening fasteners.

IQ Racer Piston / Crankshaft



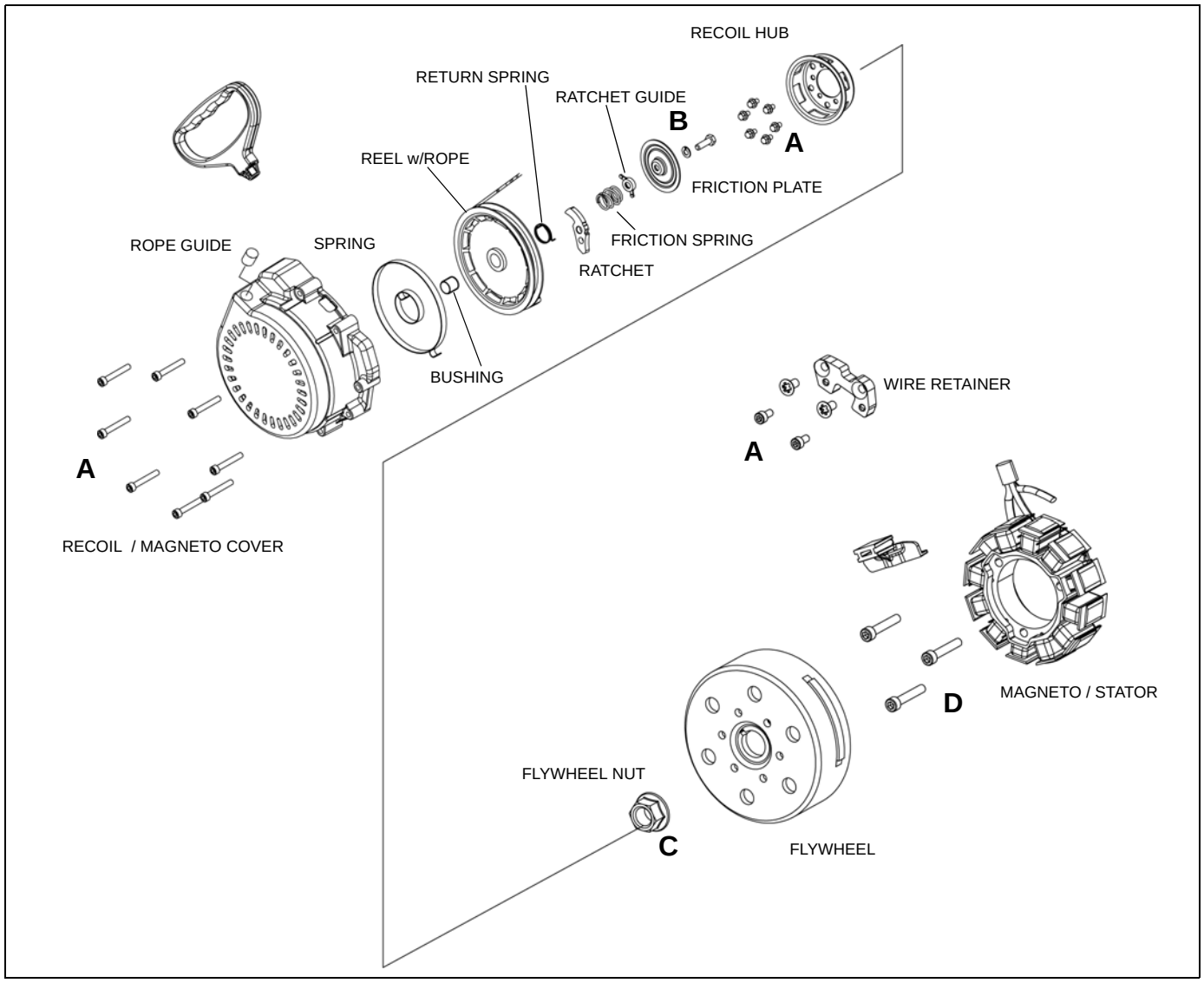
Disassembly / Assembly Process

1. To remove the pistons, follow the process for removing the cylinder head and cylinders from the engine.
2. To remove the crankshaft, follow the process for disassembling the crankcase assembly.
3. With the piston out of the cylinder, remove one of the c-clips and discard. Never re-use piston c-clips.
4. Push the piston pin out of the piston and upper rod bearings. Inspect the pin for galling and abnormal wear. Inspect the needle bearing by feel and replace as required.
5. New pistons are supplied with new rings and a piston pin. It is recommended that new needle bearings be installed as well.
6. When installing a new piston, insert one c-clip into the piston making sure the open end is 180° opposite of the groove opening.
7. Apply a liberal amount of Polaris two-stroke engine oil to the needle bearings, piston pin and piston assembly.
8. Push the pin in to the piston, then through the needle bearing. Install the remaining c-clip with the open end is 180° opposite of the groove opening.

NOTE: Always use new cylinder base gaskets.

9. Apply a liberal amount of Polaris two-stroke oil to the cylinder wall. Align the piston ring gaps around the piston locating pins. Compress the upper ring, then carefully slide the cylinder down over the ring.
10. Compress the lower ring, then slide the cylinder down over the ring.

IQ Racer Recoil / Magneto



= T
A = 9 Ft.Lbs. (12 Nm) B = 5 Ft.Lbs. (7 Nm) C = 90 Ft.Lbs. (122 Nm) - Apply Loctite 242 D = 12 Ft.Lbs. (16 Nm) - Apply Loctite 242

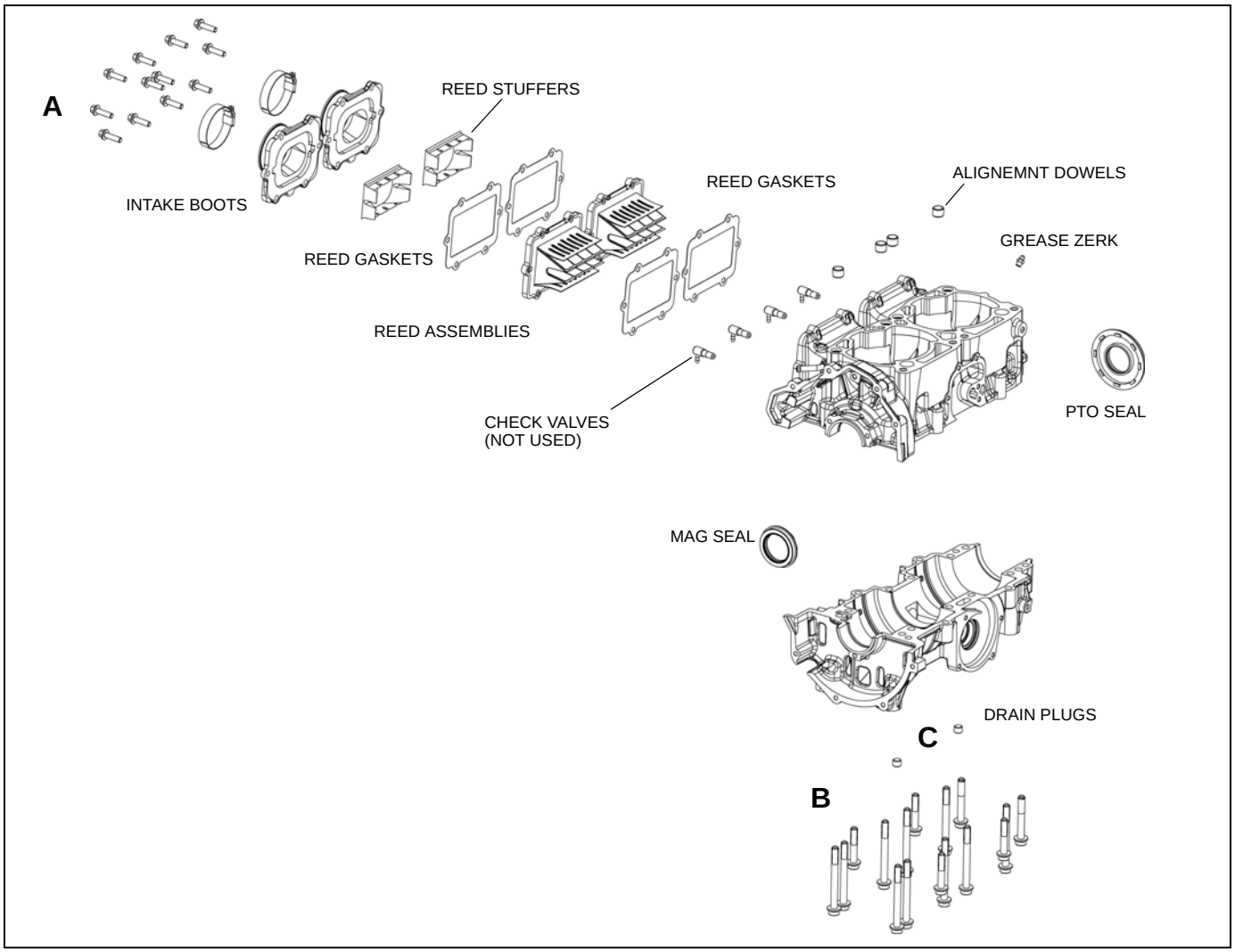
Disassembly / Assembly Process

1. Remove the exhaust pipe and resonator.
2. If the recoil assembly does not require attention, the recoil rope can remained attached to the handle. If recoil component work is desired, reference the Recoil Assembly section. See “Recoil Assembly” on page 5.10.
3. Remove the recoil / magneto housing cover. The recoil assembly is located inside the housing.
4. Remover the recoil hub from the flywheel. Secure the flywheel with a strap wrench, PN PU-45419. Remove the flywheel nut and washer.
5. Using the flywheel puller tool, PN 2871043, insert the puller’s three screws into the flywheel.

NOTE: Do not thread the puller screws into the magneto/stator located behind the flywheel.

6. Turn the puller center bolt in until the flywheel “pops” off of the crankshaft.
7. Mark the location of the magneto / stator plate in several places using a scribe.
8. Remove the magneto / stator from the crankcase.
9. Assembly is reverse of disassembly. Reference the fastener torque specifications at the beginning of the chapter.
10. Do not use an impact wrench to install the flywheel nut.

IQ Racer Crankcase



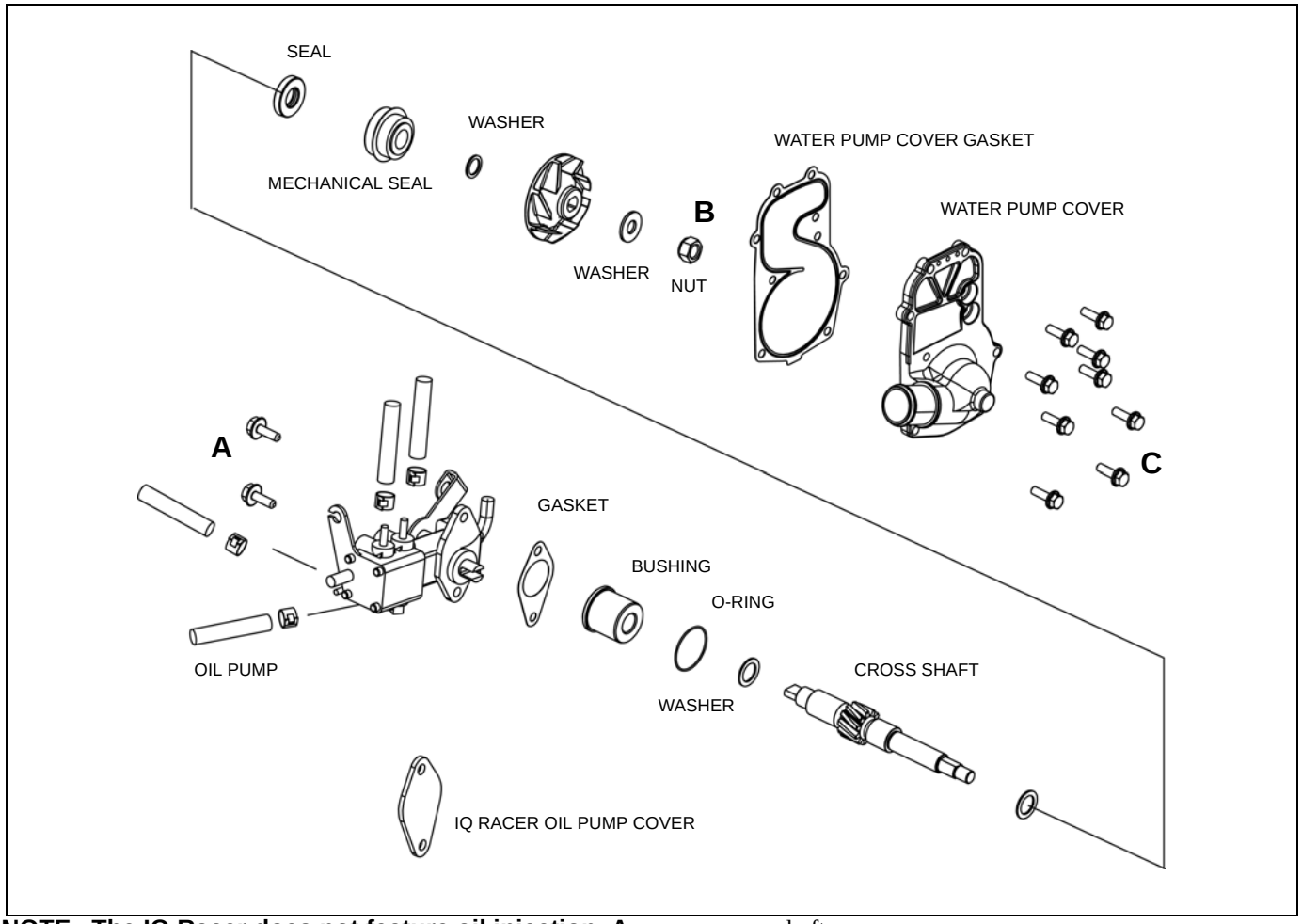
= T
A = 9 Ft.Lbs. (12 Nm) B = 22 Ft.Lbs. (30 Nm) - Apply Loctite 242 C = 10 Ft.Lbs. (13 Nm) - Apply Pipe Sealant

NOTE: Grease applied to PTO grease zerk at the time of engine manufacture. Do not grease fitting unless installing new crankshaft. Apply 10 oz. to fitting after installing new crankshaft.

Disassembly / Assembly Process

1. Remove the engine from the engine compartment.
2. Follow the process for removing the cylinder head, cylinders, pistons, flywheel / recoil housing, and the water / oil pump.
3. Remove the intake boots, reed stuffers, and reed assemblies from the intake tracks. Discard any seals or gaskets.
4. Remove the fasteners from the bottom of the crankcase. Carefully pry apart the crankcase halves. Discard the PTO and MAG crankshaft seals.
5. Remove the crankshaft. Inspect as required.
6. Thoroughly clean the two crankcase mating surfaces with carburetor cleaner and a gasket remover. Flush out the crankcase galleries.
7. Reinstall the crankshaft back into the lower crankcase using two new crankcase seals.
8. Apply a thin bead of Three Bond 1215 to the lower crankcase mating surface. Install the upper crankcase.
9. Loosely install the crankcase fasteners, then torque to the specifications at the beginning of the chapter. Use the correct torque sequence when tightening the screws.
10. Liberally coat the crankshaft bearings and components with Polaris two-stroke engine oil.

600 RR / IQ Racer Water - Oil Pump



NOTE: The IQ Racer does not feature oil injection. A cover plate is screwed into the crankcase in place of the oil pump.

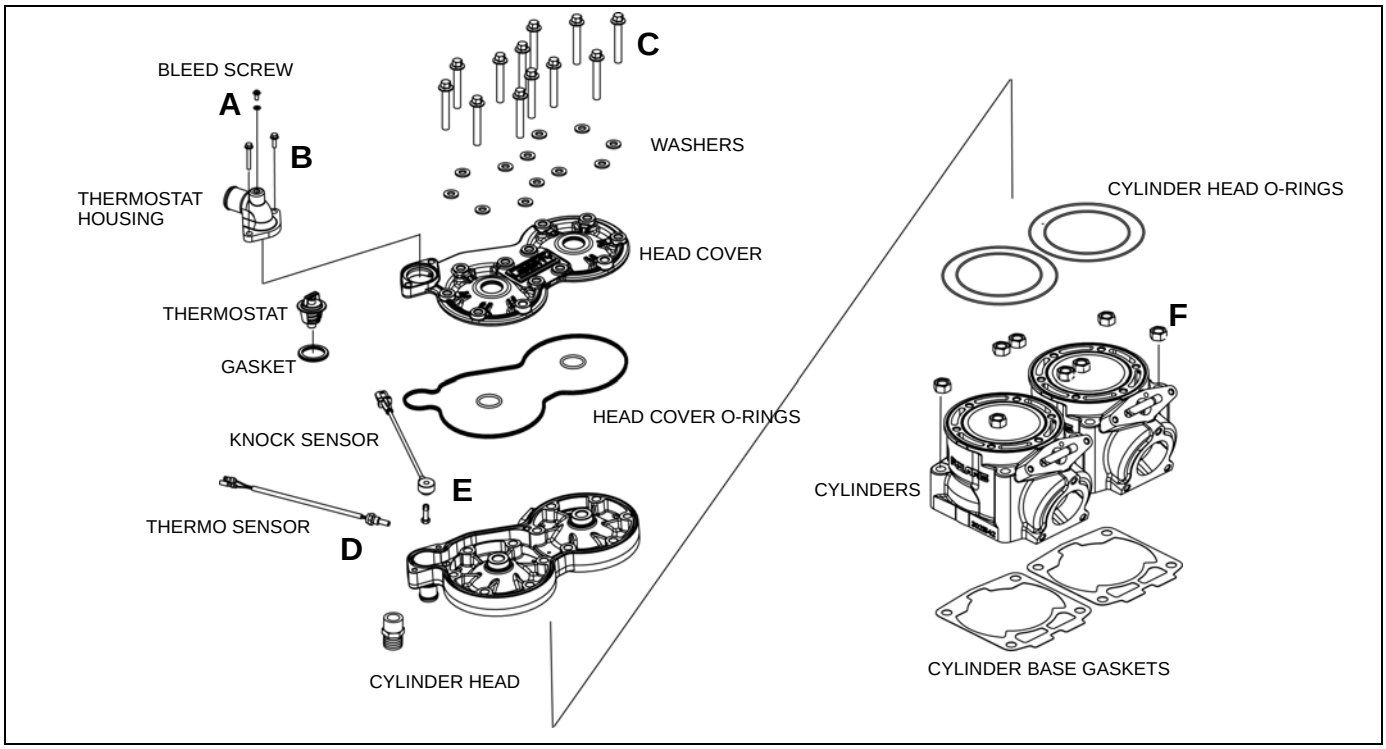
The IQ Racer engine uses a flange nut in place of a washer and nut to secure the impeller to the cross shaft.

= T
A = 7 Ft.Lbs. (9.5 Nm) B = 10 Ft.Lbs. (13 Nm) C = 9 Ft.Lbs. (12 Nm)

Disassembly / Assembly Process

1. Remove the coolant from the engine using a siphon, wet/ dry vac. or a drain pan.
2. Remove the airbox, exhaust pipe and resonator. Remove the hose connected to the water pump cover.
3. To access the impeller and mechanical seal, remove the water pump cover. Discard the water pump cover gasket.
4. Remove the impeller nut, impeller and washers from the cross shaft.
5. Carefully pry the mechanical seal and seal out of the crankcase.
6. Water pump assembly is the reverse of disassembly. Always use new seals and gaskets during assembly.
7. To remove the oil pump / cover, remove the two fasteners then pull the pump / cover out of the crankcase bore. Discard the gasket.
8. The cross shaft can be extracted from the water pump side of the crankcase.
9. Assembly is the reverse of disassembly. Always use new o-rings, seals and gaskets during assembly.
10. Install a new seal onto the shaft from the water pump side.
11. To install a new water pump seal, use the seal installation tool, PN 2872010. Verify the seal lips are facing the cross shaft gear.

600 RR Cylinders / Cylinder Head

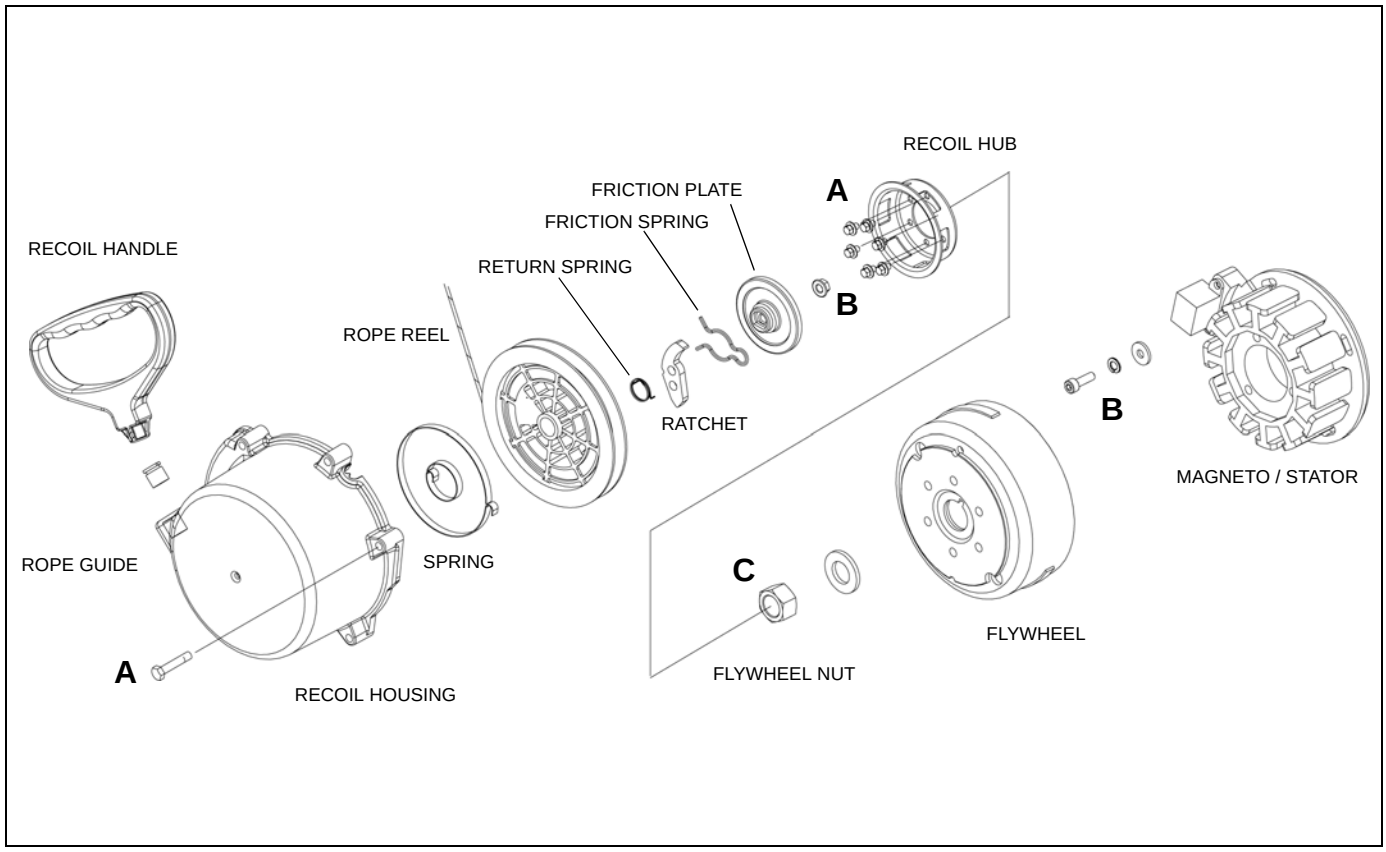


= T
A = 70 In.Lbs. (8 Nm) B = 9 Ft.Lbs. (12 Nm) - Apply Loctite 242 C = 25 Ft.Lbs. (34 Nm) - Apply Loctite 242 D = 18 Ft.Lbs. (24 Nm) - Apply Pipe Sealant E = 168 In.Lbs. (19 Nm) - Clean and Dry F = 37 Ft.Lbs. (50 Nm)

Disassembly / Assembly Process

1. Remove the coolant from the engine using a siphon, wet/dry vac, or drain pan.
2. Remove the air box, exhaust pipe and resonator from the engine compartment.
3. Remove the high tension wires and spark plugs from the cylinder head.
4. Remove the thermostat housing outlet cooling hose from the housing.
5. Loosen all, then remove all head cover fasteners. Clean the fastener threads to remove any thread locking residue.
6. Discard the head cover and cylinder head o-rings. Always use new o-rings during assembly.
7. Inspect the cylinder head / combustion domes for any damage. Measure cylinder head flatness. Replace cylinder head if required.
8. Loosen all, then remove the cylinder bolts. Clean the bolt threads to remove any thread locking residue.
9. Carefully pull each cylinder upwards taking care not to drop the piston and rod abruptly against the crankcase.
10. Remove the cylinder base gaskets. Use a gasket scraper to clean the gasket residue from the crankcase and cylinder bases.
11. Inspect the cylinder walls. Nicasil cylinders can only be lightly honed. Damage that cannot be removed with a light hone requires cylinder replacement or re-chroming.
12. The assembly process is the reverse of disassembly.
13. Always use new gaskets and o-rings during assembly. Liberally coat the inside of each cylinder and the outside of each piston with Polaris two-stroke engine oil.
14. When installing a piston into a cylinder, verify each piston ring opening is located at each piston ring locating pin. Squeeze the top ring, then carefully slide the cylinder over the compressed ring. Do the same with the bottom ring.
15. Follow the torque specifications and torque sequences located at beginning of chapter when tightening fasteners.

600 RR Recoil / Magneto



= T
A = 9 Ft.Lbs. (12 Nm) B = 5 Ft.Lbs. (7 Nm) - Apply Loctite 242 (Stator) C = 90 Ft.Lbs. (122 Nm) - Apply Loctite 242

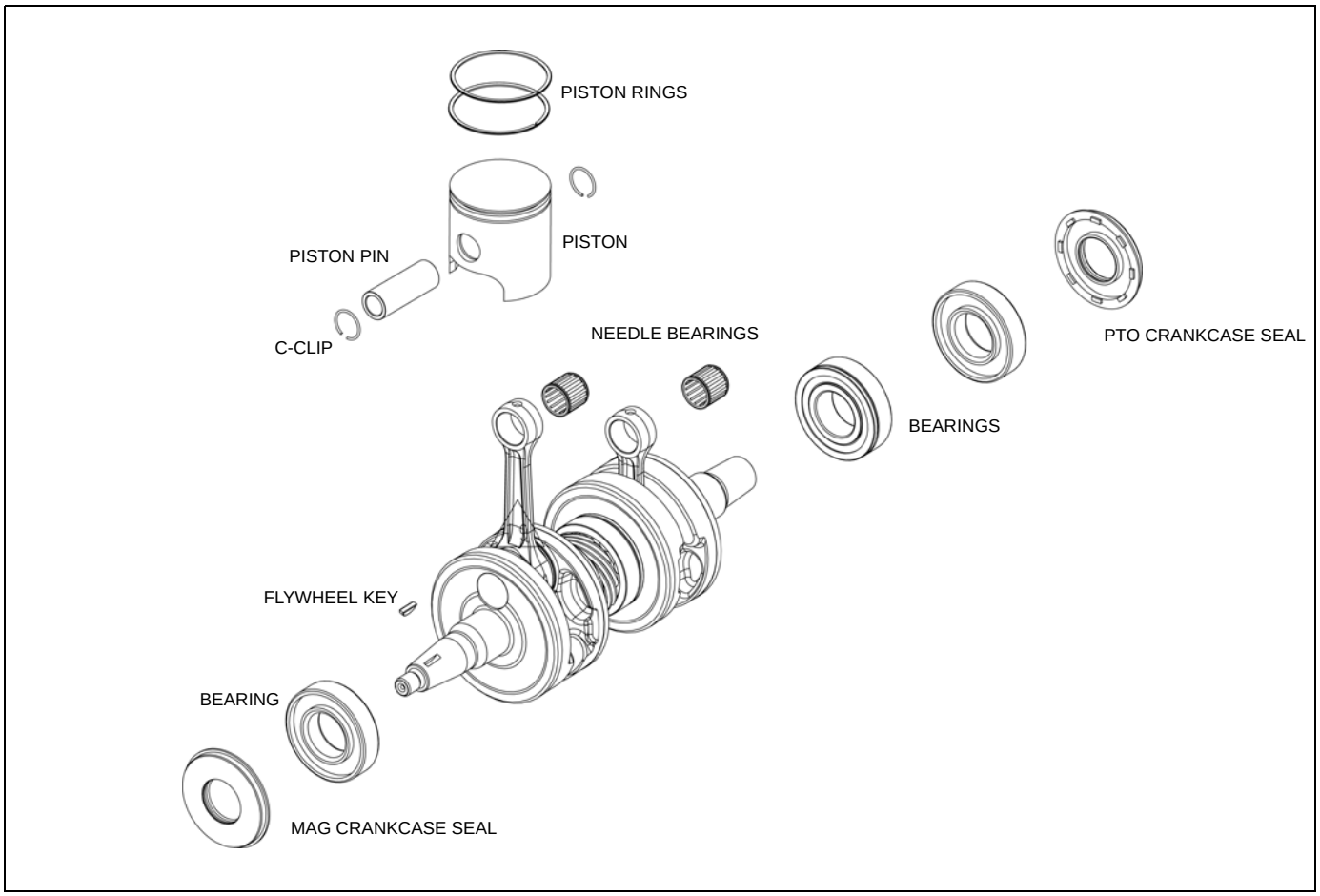
Disassembly / Assembly Process

1. Remove the exhaust pipe and resonator.
2. If the recoil assembly does not require attention, the recoil rope can remained attached to the handle. If recoil component work is desired, reference the Recoil Assembly section. See “Recoil Assembly” on page 5.10.
3. Remove the recoil / magneto housing cover. The recoil assembly is located inside the housing.
4. Remover the recoil hub from the flywheel. Secure the flywheel with a strap wrench, PN PU-45419. Remove the flywheel nut and washer.
5. Using the flywheel puller tool, PN 2871043, insert the puller’s three screws into the flywheel.

NOTE: Do not thread the puller screws into the magneto/stator located behind the flywheel.

6. Turn the puller center bolt in until the flywheel “pops” off of the crankshaft.
7. Mark the location of the magneto / stator plate in several places using a scribe.
8. Remove the magneto / stator from the crankcase.
9. Clean the crankshaft and flywheel tapers with a solvent such as clutch cleaner.
10. Assembly is reverse of disassembly. Reference the fastener torque specifications at the beginning of the chapter.
11. Do not use an impact wrench to install the flywheel nut.

600 RR Pistons / Crankshaft



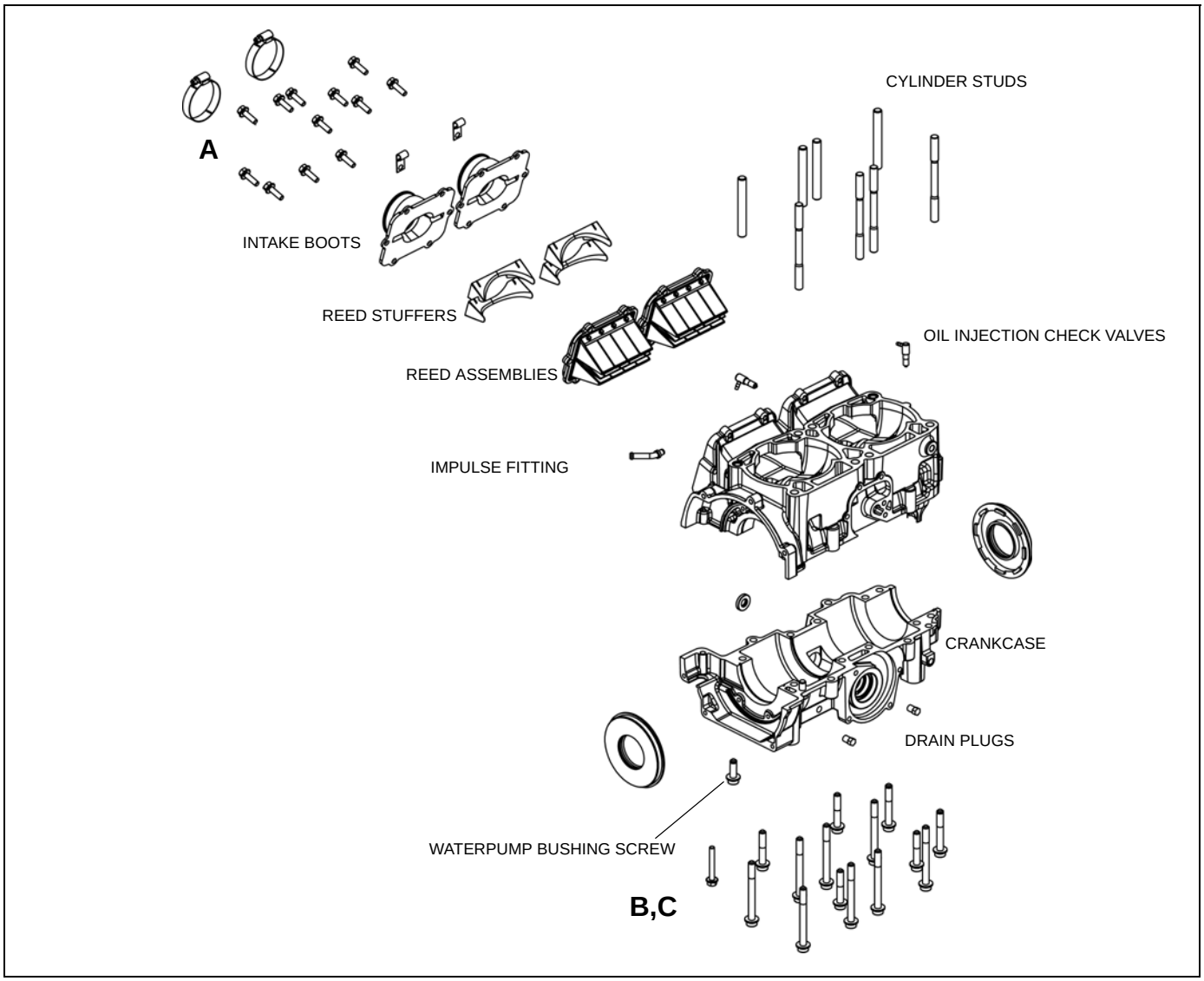
Disassembly / Assembly Process

1. To remove the pistons, follow the process for removing the cylinder head and cylinders from the engine.
2. To remove the crankshaft, follow the process for disassembling the crankcase assembly.
3. With the piston out of the cylinder, remove one of the c-clips and discard. Never re-use piston c-clips.
4. Push the piston pin out of the piston and upper rod bearings. Inspect the pin for galling and abnormal wear. Inspect the needle bearing by feel and replace as required.
5. New pistons are supplied with new rings and a piston pin. It is recommended that new needle bearings be installed as well.
6. When installing a new piston, insert one c-clip into the piston making sure the open end is 180° opposite of the groove opening.
7. Apply a liberal amount of Polaris two-stroke engine oil to the needle bearings, piston pin and piston assembly.
8. Push the pin in to the piston, then through the needle bearing. Install the remaining c-clip with the open end is 180° opposite of the groove opening.

NOTE: Always use new cylinder base gaskets.

9. Apply a liberal amount of Polaris two-stroke oil to the cylinder wall. Align the piston ring gaps around the piston locating pins. Compress the upper ring, then carefully slide the cylinder down over the ring.
10. Compress the lower ring, then slide the cylinder down over the ring.

600 RR Crankcase

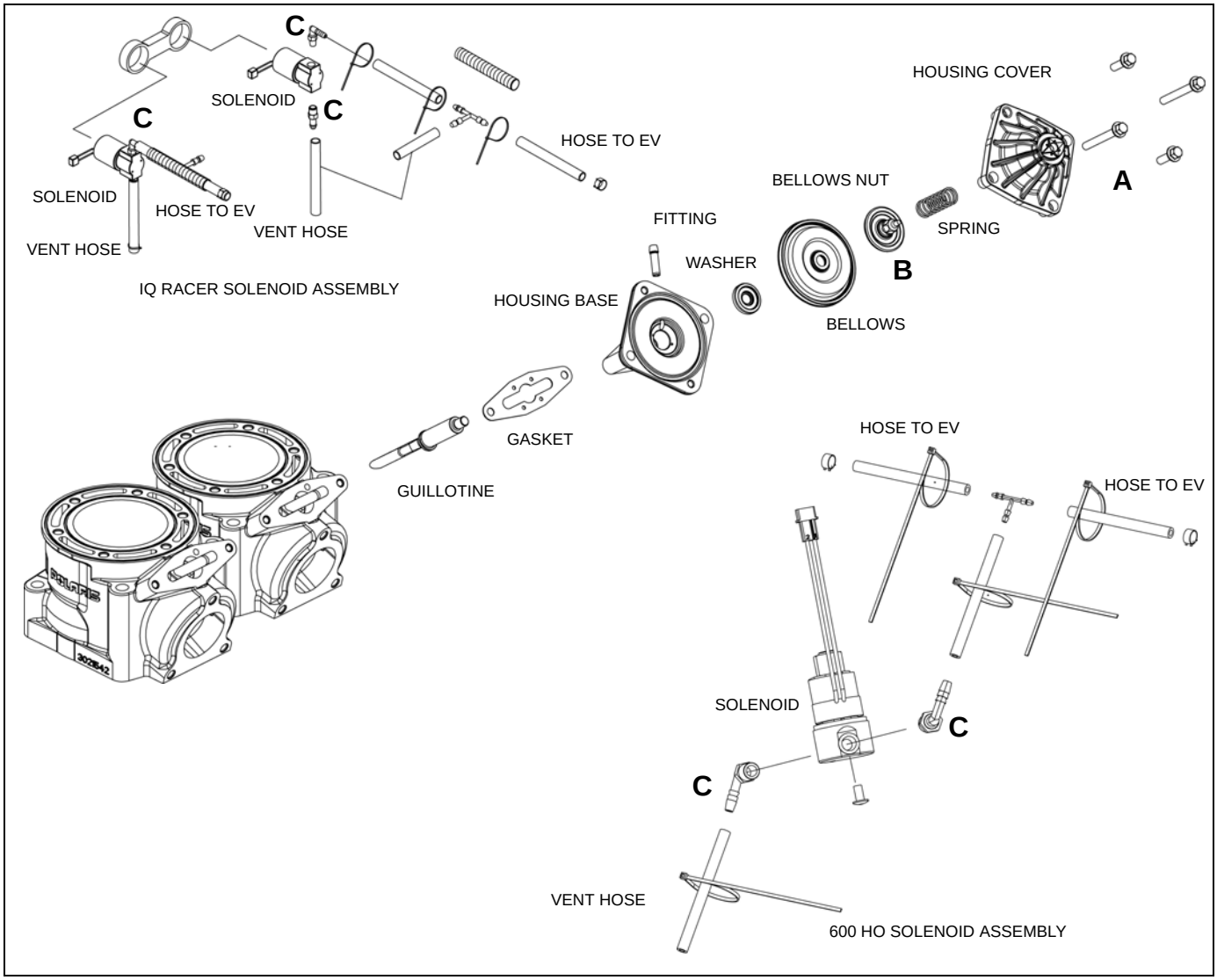


= T
A = 9 Ft.Lbs. (12 Nm) B = (M8) - 22 Ft.Lbs. (30 Nm) - Apply Loctite 242 C = (M6) - 9 Ft.Lbs. (12 Nm) - Apply Loctite 242

Disassembly / Assembly Process

1. Remove the engine from the engine compartment.
2. Follow the process for removing the cylinder head, cylinders, pistons, flywheel / recoil housing, and the water / oil pump.
3. Remove the intake boots, reed stuffers, and reed assemblies from the intake tracks. Discard any seals or gaskets.
4. Remove the fasteners from the bottom of the crankcase. Carefully pry apart the crankcase halves. Discard the PTO and MAG crankshaft seals.
5. Remove the crankshaft. Inspect as required.
6. Thoroughly clean the two crankcase mating surfaces with carburetor cleaner and a gasket remover. Flush out the crankcase galleries.
7. Reinstall the crankshaft back into the lower crankcase using two new crankcase seals.
8. Apply a thin bead of Three Bond 1215 to the lower crankcase mating surface. Install the upper crankcase.
9. Loosely install the crankcase fasteners, then torque to the specifications at the beginning of the chapter. Use the correct torque sequence when tightening the screws.

Variable Exhaust System (VES)



= T
A = 12 Ft.Lbs. (16 Nm) B = 16 Ft.Lbs. (22 Nm) C = Hand Tight - Apply Pipe Sealant

Disassembly / Assembly Process

1. Remove the two left and right screws from the housing cover. These screws secure the housing to the cylinder.
2. Carefully pull the assembly out of the cylinder. Discard the gasket.
3. Remove the remaining two screws from the cover.

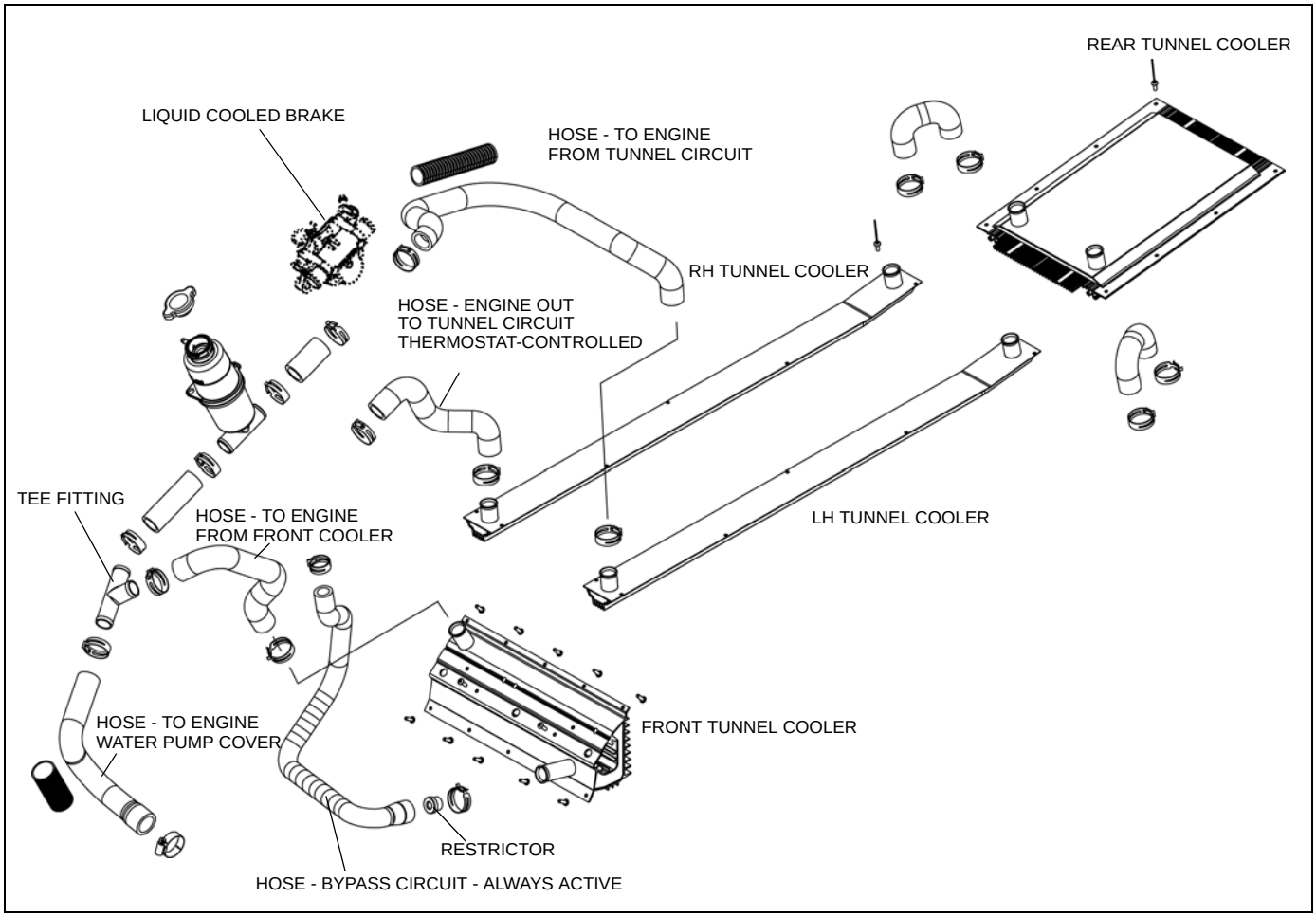
⚠ CAUTION
Wear eye protection when removing the housing cover. Spring under cover is under tension.

4. Inspect the spring and replace if abnormally worn or damaged.
5. Inspect the bellows for cuts or deformation. Thoroughly clean the guillotine using a solution of warm-soapy water and a Scotch-Brite pad.
6. Assembly is the reverse of disassembly. Always use new gaskets during assembly.

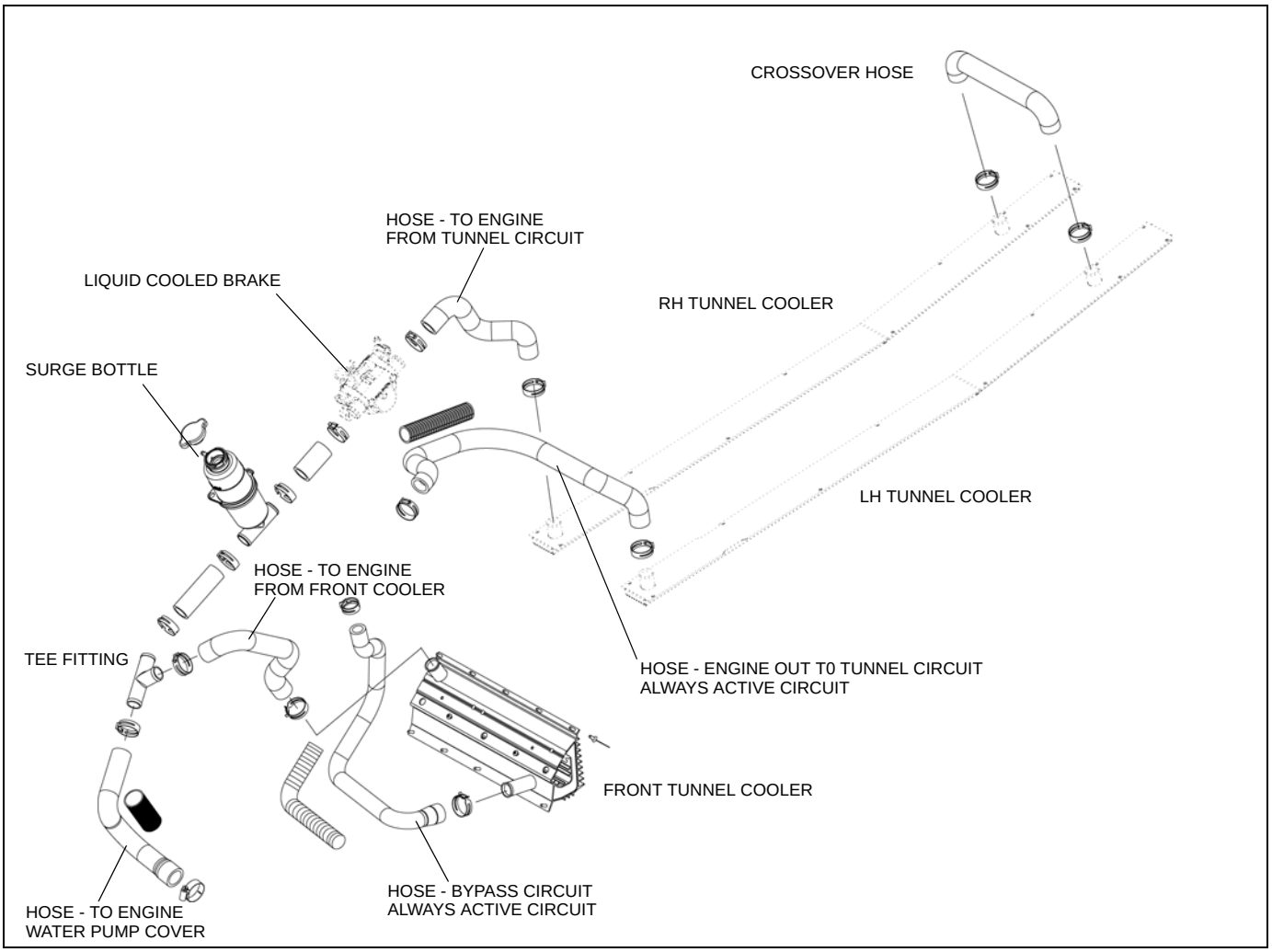
NOTE: Do not over-torque the bellows nut, or housing screws.

COOLING SYSTEMS

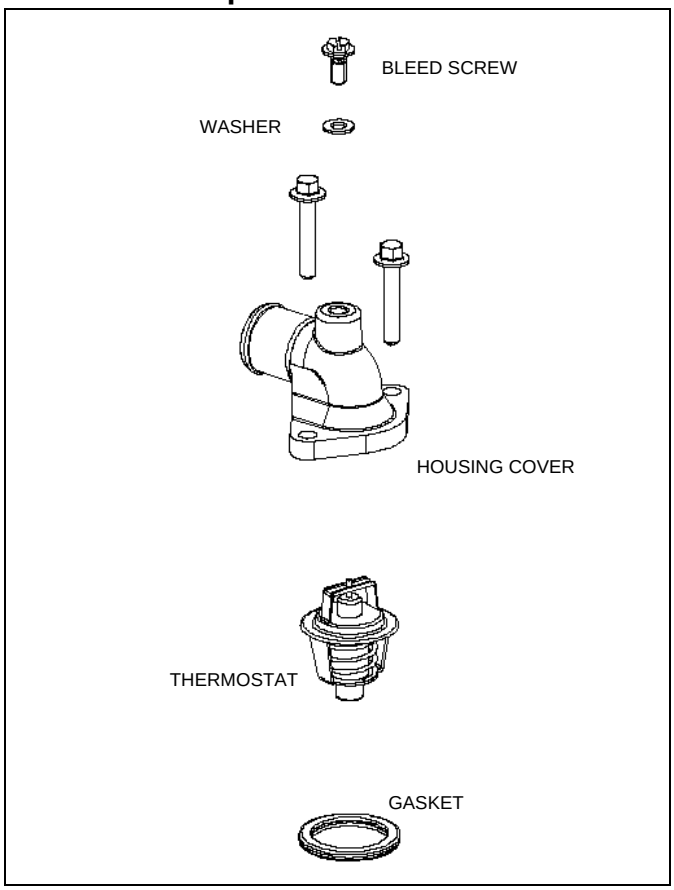
2008 IQ 600 RR



2008 IQ 600 Racer



Thermostat Replacement



1. Remove the housing cover, by removing the cover bolts.
2. Check the gasket condition and replace if damaged.
3. Replace the thermostat. Make sure that the spring side is facing downward or toward the engine.
4. Replace cover. Torque the cover fasteners to specification.

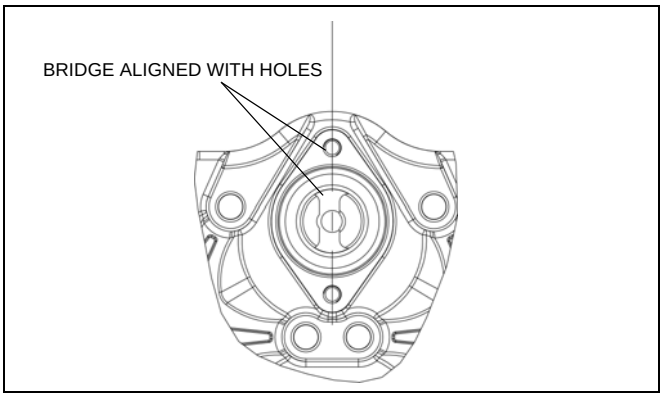
= T
Cover Fasteners: 9 Ft.Lbs. (12 Nm)

5. Verify the bleed screw and washer are installed.

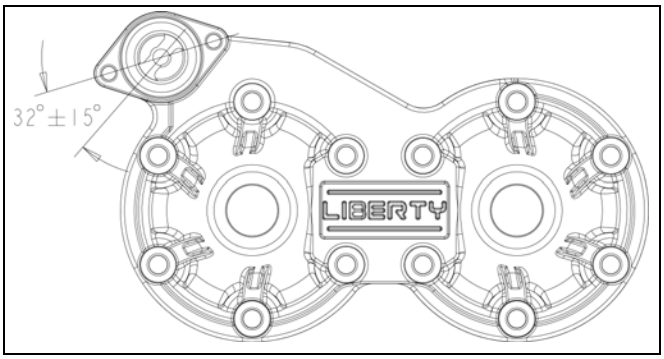
Thermostat Orientation

The thermostat must be installed in the cylinder head has shown in the illustrations.

Center Thermostat Location



Offset Thermostat Location



5

NOTES

CHAPTER 6
PVT System

PVT SYSTEM 6.2
OVERVIEW. 6.2
DRIVE SPRING 6.2
CLUTCH WEIGHT 6.2
NEUTRAL SPEED 6.2
ENGAGEMENT RPM 6.2
SHIFT OUT OVER-REV 6.2
SHIFT OUT RPM 6.2
DRIVEN SPRING 6.2
BACK-SHIFTING 6.2
FINAL GEARING 6.3
1:1 SHIFT RATIO 6.3
LOW / HIGH RATIO 6.3
DRIVEN HELIX / RAMP 6.3
GENERAL INFORMATION 6.4
SPECIAL TOOLS 6.4
DRIVE CLUTCH SPRINGS 6.5
SPRING FREE LENGTH 6.6
DRIVE CLUTCH WEIGHTS 6.6
PERC TEAM LWT DRIVEN HELIXES (24 FIN) 6.7
NON-PERC TEAM LWT DRIVEN HELIXES (24 FIN) 6.7
PERC TEAM DRIVEN HELIXES (12 FIN) 6.7
NON-PERC TEAM DRIVEN HELIXES (12 FIN). 6.8
TEAM RAMP ANGLES. 6.8
TEAM DRIVEN SPRINGS 6.9
DRIVE BELTS. 6.10
BELT INSPECTION 6.10
BELT WEAR / BURN DIAGNOSTICS 6.11
DRIVE BELT REMOVAL - TEAM DRIVEN CLUTCH. 6.12
DRIVE BELT INSTALLATION - TEAM DRIVEN CLUTCH. 6.12
ADJUSTING BELT DEFLECTION - TEAM DRIVEN CLUTCH 6.12
PVT SYSTEM ADJUSTMENTS. 6.13
CLUTCH ALIGNMENT / OFFSET 6.13
OFFSET ADJUSTMENT. 6.13
DRIVE CLUTCH 6.14
IDENTIFICATION 6.14
DRIVE CLUTCH REMOVAL. 6.14
DRIVE CLUTCH DISASSEMBLY. 6.15
ROLLER REMOVAL. 6.16
ROLLER INSTALLATION. 6.16
CLUTCH ASSEMBLY. 6.17
SPIDER INDEXING 6.18
DRIVE CLUTCH INSTALLATION. 6.19
DRIVEN CLUTCH 6.19
DRIVEN CLUTCH REMOVAL 6.19
DRIVEN CLUTCH INSTALLATION 6.19
TEAM LWT COMPONENTS. 6.20

PVT SYSTEM

Overview

> **⚠ CAUTION**
>
> Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at clutch disassembly and/or repair be made without factory authorized special tools and service procedures. Polaris recommends that only authorized service technicians that have attended a Polaris-sponsored service training seminar and understand the proper procedures perform adjustments or repairs.

The Polaris drive system is a centrifugally actuated variable speed belt drive unit. The drive clutch, driven clutch, and belt make up the torque converter system. Each clutch comes from the factory with the proper internal components installed for its specific engine model. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and adjustments of existing components must be the primary objective in clutch operation diagnosis.

Drive Spring

The drive spring opposes the shift force generated by the clutch weights, and determines the neutral RPM, engagement RPM, and wether the engine RPM remains flat, rises, or falls during shift out. When changing only the drive spring, installing a spring with a lower pre-load rate will result in a lower engagement RPM speed, while installing a spring with a higher pre-load rate will result in a higher engagement RPM.

Clutch Weight

The clutch weights generate centrifugal force as the drive clutch rotates. The force generated changes in relation to the engine RPM and with specified weight of each clutch weight. When changing only the clutch weights, a lighter weight will result in a higher engagement RPM, lower shifting force, and higher shift out RPM. Installing heavier weights has the opposite effect

Neutral Speed

Engine RPM when the force generated by the clutch weights is less than the pre-load force generated by the drive spring. In this mode, the drive clutch is disengaged.

Engagement RPM

Engine RPM when the force generated by the clutch weights overcomes the drive spring pre-load force and the moveable sheave begins to close or “pinch” the drive belt. The engagement mode continues until no more belt slippage occurs in the drive clutch. Once 100% belt engagement is achieved, the sled will accelerate along the low ratio line until the drive clutch up shift force overcomes the opposing shift force generated by the driven clutch.

Shift Out Over-Rev

Engine RPM that spikes above the desired operating RPM speed. The shift out RPM should come down to the desired operating RPM, but never below, after the driven clutch begins to open.

Shift Out RPM

Engine RPM at which the up shift force generated by the drive clutch overcomes the shift force within the driven clutch. In this mode, the drive clutch will move the belt outwards, and the driven clutch will allow the drive belt to be pulled down into the sheaves.

During WOT operation, the shift out RPM can be seen as the maximum, sustained RPM displayed on the tachometer. The shift out RPM should be the same RPM as the recommended engine operating RPM. If the shift out RPM is above the recommended engine operating RPM, install heavier drive clutch weights. If the shift out RPM is below the recommended engine operating RPM, install lighter drive clutch weights.

The shift out RPM should remain constant during both the upshift and back shift modes.

Driven Spring

A compression spring (Team driven clutch) or torsional spring (Polaris P-85 driven clutch) works in conjunction with the helix, and controls the shift rate of the driven clutch. The spring must provide enough side pressure to grip the belt and prevent slippage during initial acceleration. A higher spring rate will provide more side pressure and quicker back shifting but decreases drive system efficiency. If too much spring tension exists, the driven clutch will exert too much force on the belt and can cause premature belt failure.

Back-Shifting

Back-shifting occurs when the track encounters an increased load (demand for more torque). Back-shifting is a function of a higher shift force within the driven clutch then within the drive clutch. Several factors, including riding style, snowmobile application, helix angles, and vehicle gearing determine how efficient the drive system back-shifts. The desired engine operating RPM should never fall below 200 RPM when the drive system back-shifts.

Final Gearing

The final drive gear ratio plays an important role in how much vehicle load is transmitted back to the helix. A tall gear ratio (lower numerical number) typically results in lower initial vehicle acceleration, but a higher top-end vehicle speed. A lower gear ratio (higher numerical number) typically results in a higher initial vehicle acceleration, but a lower top-end vehicle speed.

Choosing the proper gear ratio is important to overall drive system performance. When deciding on which gear ratio to use, the operator must factor in the decision where the snowmobile will be ridden, what type of riding will be encountered, and the level of performance the operator hopes to achieve.

Gearing a snowmobile too low for extended high-speed runs may cause damage to the drive belt and drive system, while gearing a snowmobile too high for deep-snow, mountain use may cause premature belt and clutch wear.

Typically, it is recommended to gear the snowmobile with a slightly higher ratio than the actual top speed the snowmobile will ever achieve.

1:1 Shift Ratio

A 1:1 shift ratio occurs when the drive clutch and the driven clutch are rotating at the same RPM.

The mathematical vehicle speed for a given gear ratio at a 1:1 shift ratio is represented in the chaincase gearing charts located in the Final Drive Chapter.

Low / High Ratio

Low ratio is the mechanical position when the drive belt is all the way down into the drive clutch, and all the way out on the driven clutch. High ratio represents when the drive belt is all the way out on the drive clutch, and all the way in on the driven clutch.

Driven Helix / Ramp

The helix cam is the primary torque feedback component within the driven clutch, regardless of driven clutch type. The beginning angle of the helix must transmit enough torque feedback to the moveable sheave in order to pinch the drive belt while minimizing belt slip. The flatter or lower the helix angle, the more side force will be exerted on the moveable sheave, while the steeper, or higher the helix angle, the less side force will be exerted on the moveable sheave.

GENERAL INFORMATION

Special Tools

Team “12 Cooling Fin Driven Clutch” Offset Alignment Tool	PS-46998
Team “24 Cooling Fin Driven Clutch” Offset Alignment Tool	PS-47477
Drive Clutch Puller (3/4 - 16 x 7/16) - All Fuji Fan / Liquid Cooled Engines	2872084
Drive Clutch Puller (3/4 - 16 x 14mm) - Domestic 500 / 600 / 700 / 800 / FS / FST Engines	2872085
Drive Clutch Puller (14mm) -	2871855
Replacement Handle for ALL Clutch Pullers	5020326
Drive Clutch Holding Wrench	9314177-A
Strap Wrench	PU-45419
Replacement Strap	305085
Drive Clutch Spider Nut Socket	2870338
Drive Clutch Spider Removal and Spider Installation Tool	2870341-A
Pin Centering Tool	2870401
Clutch Pin Installation Tool	2870402
Clutch Pin Punch	2870507
Tapered Reamer - 29mm Short Drive (Fuji Snow Engines Only)	2870576
Tapered Reamer - 29mm Long Drive (Non-2007 600/700 CFI Domestic Snow Engines Only)	PS-48584
Tapered Reamer - 31mm (2007 600/700 CFI Domestic Snow Engines Only)	PS-48587
Roller Pin Tool	2870910-A
Drive Clutch Button Removal Tool	2870985
Clutch Bushing Replacement Tool Kit	2871025
Clutch Holding Fixture	2871358
Clutch Compression Tool	8700220
Spider Assembly Tool	8700221
Clutch Compression Tool Extensions for TEAM driven	PS-45909
Clutch Pilot Tool (used with the 2871358 to compress the clutch)	PU-45779
Drive Clutch Compression Tool (Compresses drive clutch without removing clutch from engine.)	2871173

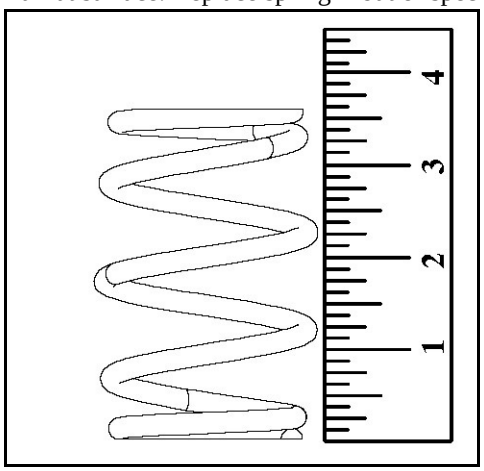
Drive Clutch Springs

PART NUMBER	COLOR	WIRE DIAMETER (inches)	FREE LENGTH +/-.125”	FORCE LBS.@2.50” - 1.19” (+/- 12 LBS.)	LOAD RATE (lbs./inch)
7041021	Clear	.157”	4.14	70 - 130	44
7041022	Black	.140”	4.25”	44 - 77	25
7041063	Purple	.168	4.37	75 135	53
7041062	Silver	.207	3.12	75 - 243	151
7041065	Pink	.177	4.69	112 - 200	64
7041060	Orange	.196	3.37	70-199	98
7041083	Red	.192	3.77	120 - 245	94
7041102	Yellow	.192	2.92	44 - 185	105
7041061	Brown	.200	3.14	69 - 212	109
7041132	White	.177	2.92	34 - 141	81
7041168	Green	.177	3.05	42 - 142	76
7041148	Gold	.207	3.25	100 - 275	133
7041150	Red/White	.192	3.59	100 - 220	91
7041286	Silver/Gold	.218	3.05	77 - 240	163
7041080	Blue	.207	3.55	120 - 300	137
7041781	Dark Blue/White	.225	3.42	120 - 310	145
7041945	Almond	.218	3.65	140 - 330	145
7041645	Almond/Gold	.207	4.00	150 - 290	107
7041818	Black/White	.218	3.52	140 - 320	137
7041816	Almond/Black	.200	3.75	165 - 310	111
7041922	Almond/Blue	.218	3.75	150 - 310	122
7041988	Almond/Red	.207	4.27	165 - 310	110
7042083	Black/Green	.218	3.38	120 - 340	168
7043342	Black - 3342	.218	3.46	140 - 330	145
7043076	Black - 3076	.225	2.67	40 - 340	229
7043120	Black - 3120	.225	2.78	60 - 340	213
7043077	Black - 3077	.255	2.90	80 - 340	198
7043121	Black - 3121	.255	3.05	100 - 340	183
7042287	Black - 2287	.207	3.40	110 - 290	137

NOTE: Springs listed as color - #### will have the last four digits of the part number painted on the spring coil. Tag each spring with the part number and spring force when not in use.

Spring Free Length

Measure the drive and driven spring free length with the spring resting on a flat surface. Replace spring if out of specification.



In addition to proper free length, the spring coils should be parallel to one another when placed on a flat surface. Distortion of the spring indicates stress fatigue. Replacement is required.

⚠ CAUTION

Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch cover failure

Drive Clutch Weights

Full Tail Weights

WEIGHT	GRAMS	PART NUMBER
S43H	43	1321849
S45H	45	1321850
S47H	47	1321851
S49H	49	1321730
S51H	51	1321731
S53H	53	1321759
S55H	53	1322004

10 Series Weights

WEIGHT	GRAMS(+/- 1g)	PART NUMBER
10M - R	44	1321530
10M - W	46	1321527
10M - B	47.5	1321529
10M - 5	48.8	1321528
10M	49.5	1321531
10A - L	51	1321531
10	51.5	1321526
10A	53	1321589
10-54	54	1321685
10-56	56	1321684
10-58	58	1321588
10-60	60	1321587
10-62	62	1321586
10-62M	61.5	1321614
10-64	64	1321585
10-64M	63.5	1321615
10-66	66	1321584
10-68	68	1322427
10-70	70	1322414
10-72	72	1322428
10-74	74	1322429
10-76	76	1322585
10-78	78	1322586

11 Series Weights

WEIGHT GRAMS(+/- .8g)	PART NUMBER
11-40	1322593
11-42	1322592
11-44	1322591
11-48	1322590
11-50	1322589
11-52	1322595
11-64	1322604
11-66	1322559
11-68	1322558
11-70	1322523
11-72	1322524
11-74	1322525
11-76	1322526

PERC Team LWT Driven Helixes (24 Fin)

PART NUMBER	DESCRIPTION
5135401	64 / 42 - .36
5135402	64 / 38 - .25
5135403	56 / 42 - .36
5135503	54 / 38 - .25
5135504	S36
5135772	66 / 44 - .46

Non-PERC Team LWT Driven Helixes (24 Fin)

PART NUMBER	DESCRIPTION
5135375	62 / 40 - .46 64 / 40 - .55
5135376	64 / 38 - .65 64 / 38 - .46
5135438	70 / 44 - .46 66 / 44 - .46
5135480	64 / 38 - .65 64 / 38 - .46
5135486	62 / 40 - .46 64 / 40 - .55
5135521	74 / 50 - .46 74 / 48 - .46
5135522	74 / 44 - .46 74 / 40 - .46
5135523	70 / 50 - .46 70 / 48 - .46
5135524	70 / 44 - .46 70 / 40 - .46
5135525	66 / 50 - .46 66 / 48 - .46
5135526	66 / 44 - .46 66 / 40 - .46
5135537	64 / 38 - .65

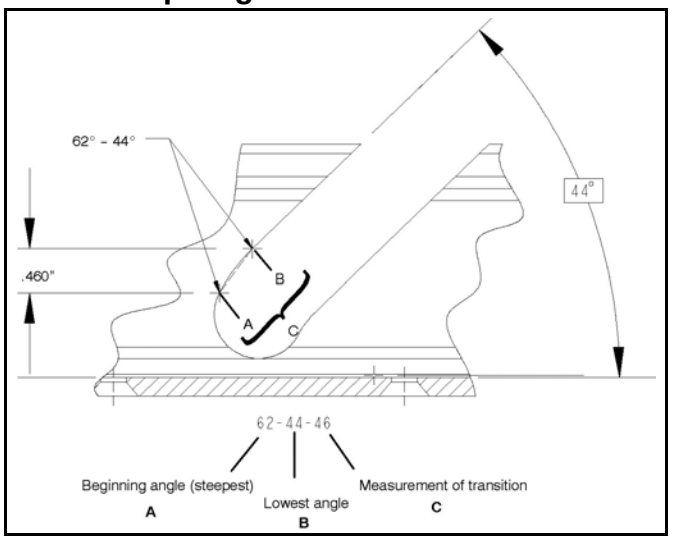
PERC Team Driven Helixes (12 Fin)

PART NUMBER	DESCRIPTION
5133687	58 / 44 - .46
5133771	58 / 42 - .46
5133772	62 / 46 - .46
5133773	62 / 42 - .46
5133784	58 / 40 - .46
5133785	62 / 40 - .46
5133786	62 / 44 - .46
5133787	62 / 48 - .46
5133788	60 / 44 - .46
5133789	60 / 46 - .46
5133886	54 / 42 - .46
5134095	56 / 42 - .36
5134132	58 / 42 - .36
5134204	64 / 44 - .65
5134226	60 / 42 - .75
5134263	54 / 38 - .25
5134264	64 / 42 - .65
5134507	58 / 46 - .46
5134508	60 / 42 - .46
5134721	62 / 46 - .36
5134722	62 / 42 - .36
5134877	64 / 38 - .36
5135057	62 / 38 - .36
5135242	64 / 38 - .25
5135243	64 / 36 - .25
5135256	64 / 42 - .36
5135276	64 / 42 - .46

Non-PERC Team Driven Helixes (12 Fin)

PART NUMBER	DESCRIPTION
5133321	66 / 44 - .46 70 / 48 - .36
5133491	74 / 48 - .46 70 / 48 - .46
5133492	74 / 44 - .46 74 / 40 - .46
5133493	72 / 44 - .46 72 / 40 - .46
5133494	70 / 44 - .46 70 / 40 - .46
5133495	68 / 44 - .46 68 / 40 - .46
5133496	66 / 48 - .46 66 / 40 - .46
5133497	64 / 44 - .46 64 / 40 - .46
5133498	62 / 44 - .46 62 / 40 - .46
5133499	58 / 44 - .46 58 / 40 - .46
5133721	66 / 44 - .46 70 / 44 - .46
5133887	S40
5133904	S36
5133995	62 / 46 - .46 66 / 46 - .46
5134746	64 / 38 - .65 66 / 40 - .55
5134861	58 / 34 - .46 60 / 34 - .65

Team Ramp Angles



The angles and length of the transition between the first and final angle is stamped on the back of the helix. The first number (A) designates the starting angle of the ramp. The second number (B) designates the finish angle. The last number (C) is the transition distance (in inches) between the starting and finish angles.

CAUTION

Do not install a non-ER helix on a Perc-equipped snowmobile where the engine changes directions.

Team Driven Springs

TEAM Driven Springs

PART NUMBER	COLOR	LOAD @ 2.2″(lbs)	LOAD @ 1.1″(lbs)	Rate (Lbs. per inch)
7042181	Black/Yellow	145	208	56
7043058	Red/Black	140	240	90
7043059	Red/Green	120	220	90
7042066	Green/Black	135	198	56
7043061	Red/Silver	125	175	45
7043062	Red/Yellow	100	150	45
7043057	Red/Blue	140	200	54
7043063	Black/Red	155	222	65
7043064	Blue/Black	123	203	73
7043060	Red/White	100	200	91
7043069	Red/Pink	140	260	110
7043363	Black/Purple	160	240	72
7043252	Black - 160 / 280	160	280	109
7043253	Black - 180 / 280	180	280	91
7043254	Black - 140 / 300	140	300	146
7043255	Black - 160 / 300	160	300	127
7043256	Black - 180 / 300	180	300	109

NOTE: Team driven springs listed with a color - ### / ### will have the beginning and ending spring rates painting on the spring coils. Tag the spring with the part number when not in use.

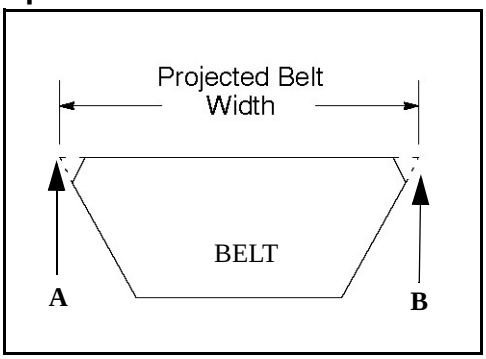
Drive Belts

Part Number	Belt Width (Projected)* in/mm	Side Angle Overall*	Center to Center in/cm*	Outer Circumference in/cm	Notes
3211080	1.438 / 36.5	28°	11.5 / 29.2	46.625/118.4	Double Cog CVT version of 3211078
3211078	1.438 / 36.5	28°	11.5 / 29.2	46.62 / 118.4	Standard Drive Belt
3211117	1.46 / 37.1	26°	11 / 27.9	45.79 / 116	MBL High Performance Belt “Sanded Finish”
3211121	1.46 / 37.1	26°	11 / 27.9	45.79 / 116	MBL Kevlar Belt “Cut Finish”
3211122	1.46 / 37.1	26°	11.5 / 29.2	46.77 / 118.8	MBL Kevlar Belt “Cut Finish”
3211114	1.438 / 36.5	26°	10.625 / 27	45.2 / 114	MBL High Performance Race Belt “Sanded Finish”
3211115	1.46 / 37.1	26°	11.5 / 29.2	46.77 / 118.8	MBL High Performance Belt “Sanded Finish”

*Belt dimensions are given in nominal dimensions. There is a +/- variance for all critical dimensions. Clutch set up must be inspected when a new belt is installed and, if necessary adjusted.

The drive belt is an important component of the converter system. In order to achieve maximum efficiency from the converter, drive belt tension (deflection), clutch offset, and alignment must be adjusted properly.

Belt Inspection



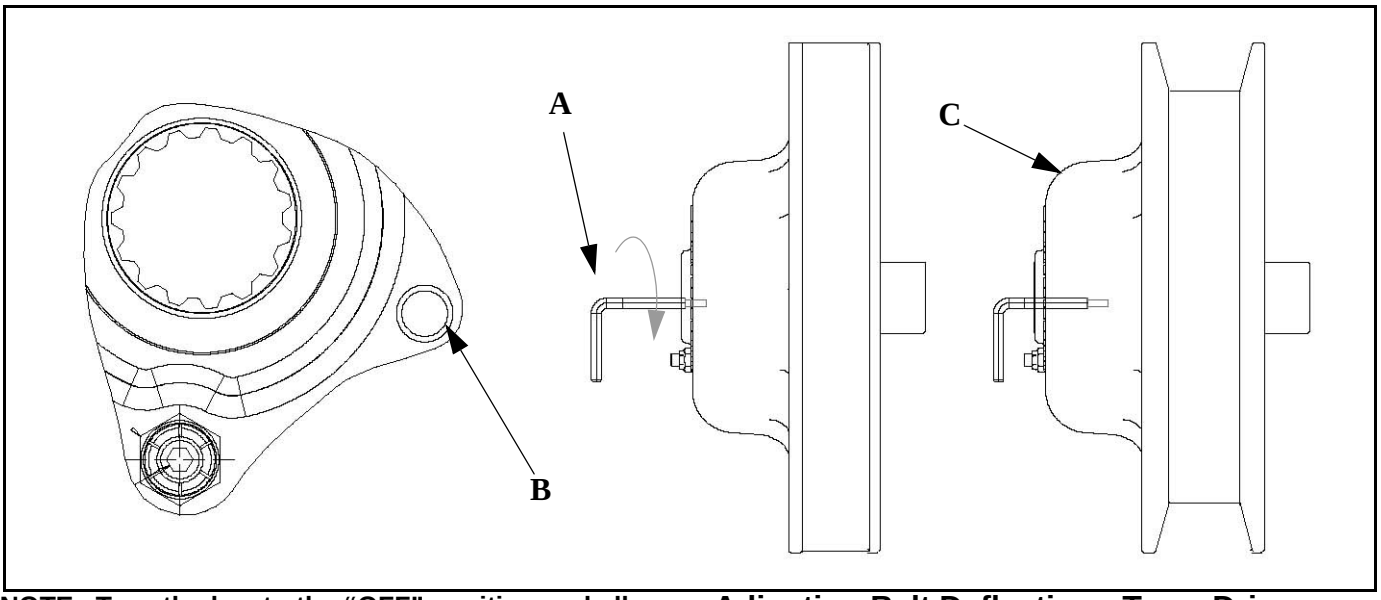
1. Measure the belt width and replace it if it is worn severely. Generally a belt should be replaced if the clutches can no longer be adjusted to provide the proper belt deflection.
   - Project the side profiles and measure from corner to corner.
   - Place a straight edge on each side of the drive belt and measure the distance where the straight edges intersect at the top (A,B).
2. Inspect the belt for loose cords. missing cogs, cracks, abrasions, thin spots or excessive wear spots. Replace if necessary.
3. Inspect the belt for hour glassing (extreme circular wear in at least one spot an on both sides of the belt). Hour glassing occurs when the drive train does not move and the drive clutch engages the belt. Example would be taking off while the track is frozen to the ground. Remember to always warm up the track and free it from the ground.

Belt Wear / Burn Diagnostics

Table 6-1: Belt Wear / Burn Diagnostics

POSSIBLE CAUSE	SOLUTION
Driving at or about engagement RPM for extended periods of time in any type of snow condition.	Drive at higher RPM if possible. Gear the machine down. Make sure belt deflection is at 1 1/4” to achieve optimum starting ratio.
Cold weather startups	Be patient. Warm up engine at least 5 minutes or until it readily responds to throttle input. For the quickest most efficient drive away in extreme cold weather, take drive belt off machine and bring it in to a warm environment. Break skis and track loose from the snow. Engage throttle aggressively for short durations for initial cold drive away
Towing another machine at or about engagement RPM	When possible, do not go in deep snow when towing another machine. Use fast, effective throttle to engage the clutch. Not all machines are intended for pulling heavy loads or other machines.
Spinning track while vehicle is stuck (high RPM, low vehicle speed, high ambient temp. Example: 8000 RPM, 10mph actual vehicle speed and 60 m.p.h. indicated on speedometer.	Lower the gear ratio. Remove windage plates from driven clutch. If possible, move to better snow conditions and reduce RPM. Avoid riding in very high ambient temperatures
Ice and snow piled up between track and tunnel overnight or after stopping for a long period of time (enough to re-freeze the snow).	Break loose snow and ice under tunnel. Allow longer than normal warm-up. Allow belt to warm sufficiently and increase grip ability on clutch sheaves. Use fast, effective throttle when engaging clutch.
Poor running engine (Bog, Miss, Backfire, etc.)	Maintain good state of tune including throttle and choke synchronization. Check for fouled spark plug(s). Check for foreign material in carburetors. Make sure no water or ice is present in the fuel tank, lines, or carburetors.
Loading machine on trailer	Use caution when loading machine. Carbide skags may gouge into trailer and prevent drive train from spinning freely. Use enough speed to drive completely onto trailer. If machine cannot be driven completely onto trailer, it may need to be pulled or pushed to avoid belt wear / burning.
Clutch malfunction	Check for correct clutch components, or damage on the clutch
Slow, easy belt engagement - easing on the throttle	Use fast, effective throttle to engage the clutch.

Drive Belt Removal - Team Driven Clutch



NOTE: Turn the key to the "OFF" position and allow the engine to come to a complete stop.

1. Verify the driven clutch is not in reverse. Open the clutch guard.

⚠ CAUTION

Damage to the driven clutch or L wrench will occur when attempting to open the driven clutch when the driven clutch is in the reverse position.

2. Insert the L wrench, PN 2874857 (A), into the threaded hole (B) located on the driven clutch, and turn it clockwise until the clutch sheaves are in the open position (C).
3. Remove the drive belt.

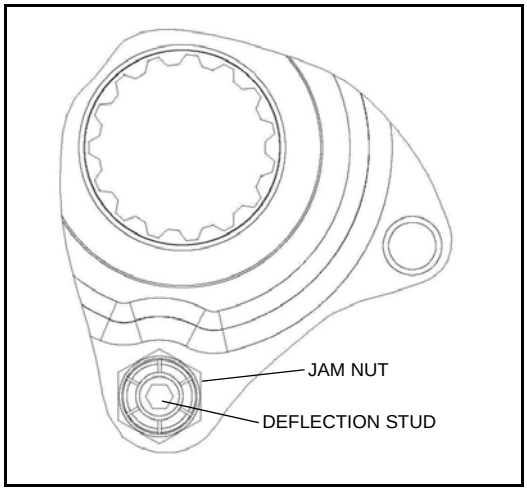
Drive Belt Installation - Team Driven Clutch

1. With the L wrench inserted into the threaded into hole and the sheaves in the open position, install the drive belt.

NOTE: Install belt so that the numbers can be read correctly on the left side of the machine or in the direction in which the belt was originally installed.

2. Remove the wrench. "Wiggle" the belt to remove slack while removing the wrench.
3. Close the clutch guard.

Adjusting Belt Deflection - Team Driven Clutch



1. Loosen the jam nut.
2. Using an 1/8″ Allen head wrench, turn the stud counter-clockwise to decrease belt deflection and clockwise to increase belt deflection.
3. When the proper belt deflection is achieved torque the lock nut to 90 - 110 in-lb. (10 - 12 Nm).

NOTE: When using a MBL drive belt, the belt deflection should be set so that .9″ to .10″ of the outer cogs are outside of the driven sheaves.

WINNING PERFORMANCE POLARIS

PVT SYSTEM ADJUSTMENTS

Clutch Alignment / Offset

The engine is mounted in the bulkhead so the drive and driven clutches self-align under high torque loads.

Offset is controlled by the number of washers installed on the jackshaft behind the driven clutch.

1. Remove drive belt.
2. Install the correct alignment tool depending on the type of driven clutch installed on the snowmobile.

TOOL PART NUMBER	APPLICATION
PS-46998	Standard Team Driven
PS-47477	Light Weight (LW) Team Driven

NOTE: A standard alignment tool will not work with a Team LW driven clutch. Likewise, a LW alignment tool will not work with a standard Team driven clutch. A Team LW driven clutch can be identified as having 24 cooling fins.

3. The optimum setup is when the front and rear of the tool touch the driven clutch. No gap should be present in the front, and the rear clearance should not exceed .060" (3mm).

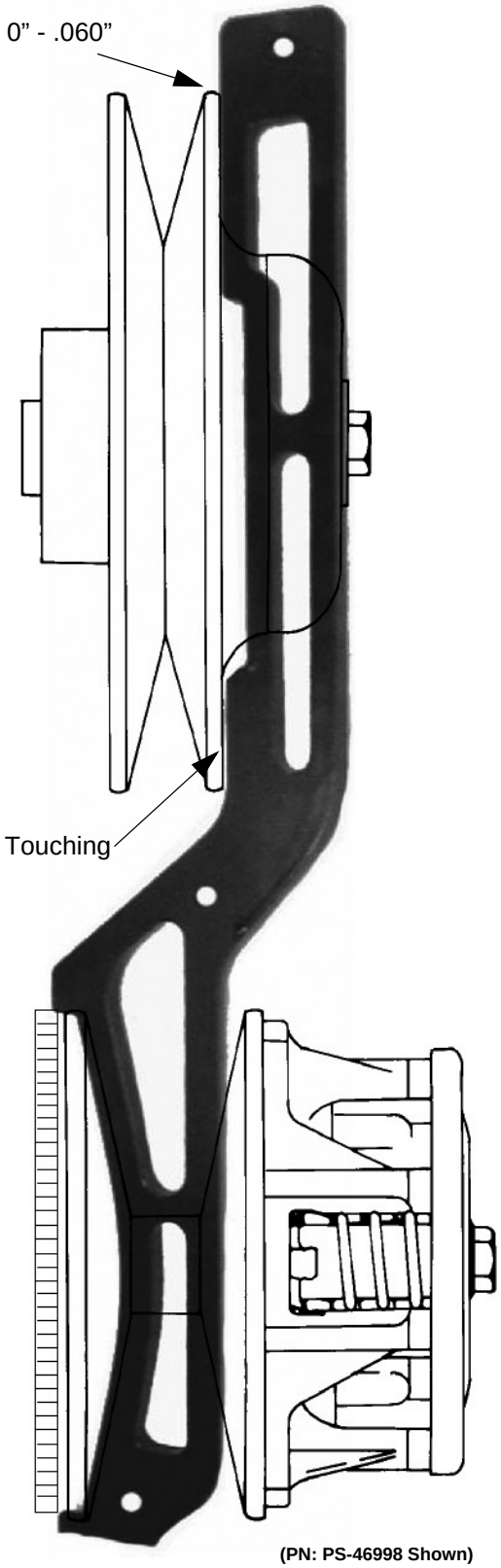
NOTE: If the front of the alignment bar does not touch the driven sheave, the maximum clearance cannot exceed .025″.

Offset Adjustment

1. Determine direction driven clutch needs to be adjusted.
2. Remove driven clutch retaining bolt, and remove driven clutch.
3. Add or remove washers from the jackshaft between the driven clutch and jackshaft bearing to achieve proper offset.
4. After adjusting offset, add or remove shim washers from the retaining bolt to provide a +/- 0.030” (.75mm) of float on the jackshaft.

⚠ CAUTION

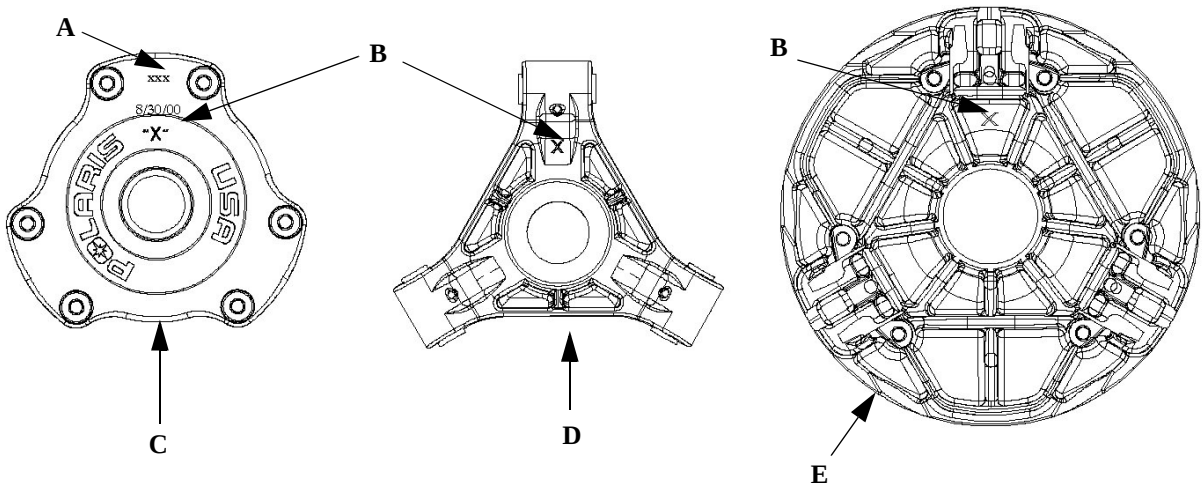
Always verify the driven clutch floats on the jackshaft after securing the fastener. The jackshaft bearing will fail due to side-loading if the driven clutch is not allowed to float.



(PN: PS-46998 Shown)

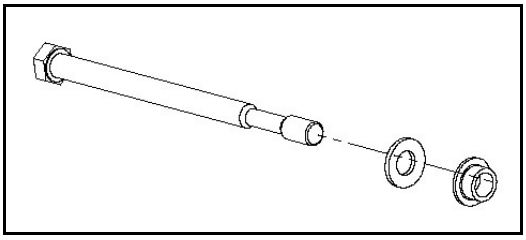
DRIVE CLUTCH

Identification



Every clutch will have the last three digits of the clutch part number etched on to the cover (A). The “X" (B) marking is an index mark where the clutch cover (C), clutch spider (D) and the stationary sheave (E) should line up when the clutch is assembled.

Drive Clutch Removal



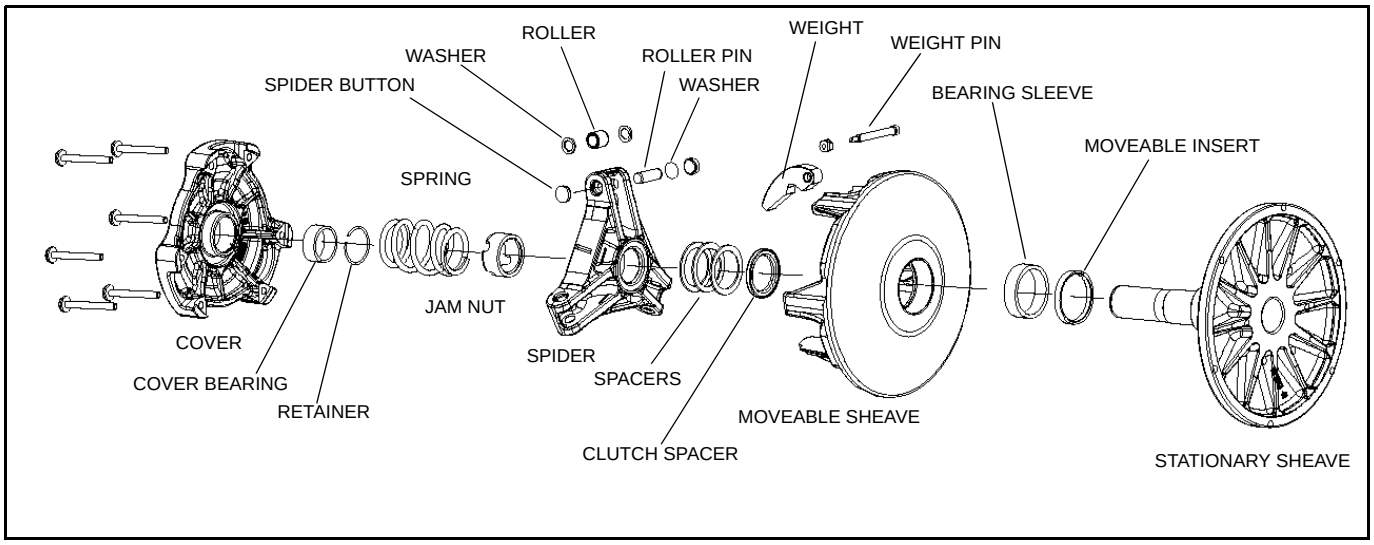
NOTE: All clutch tools can be found at the beginning of this chapter.

1. Remove the belt.
2. Place the clutch holding tool (PN 9314177-A) on the drive clutch.
3. Remove the drive clutch retaining bolt. Note the placement and number of washers on retaining bolt.
4. Insert the correct clutch puller into the retaining bolt hole.
5. Tighten the puller into the clutch. If the clutch does not come off, strike the clutch puller head with a hammer. If the clutch does not “pop” off, continue to tighten the clutch puller, and repeat this step.

⚠ CAUTION

Do not use an impact wrench to remove or install the clutch bolt or clutch puller. Damage to the clutch and/or crankshaft can occur.

Drive Clutch Disassembly



⚠ CAUTION

Wear eye protection when servicing the drive clutch. Sheaves must be marked to provide a reference point for dutch balance and spider indexing. If the sheaves are not marked and the spider washers are changed or misplaced, the clutch may be out of balance and damage to the clutch may result.

⚠ WARNING

Clutch spring is under extreme tension, use caution when disassembling the clutch.

1. In a straight line, mark the sheaves and the cover with a black marker or etched with a scribe.
2. Remove the clutch.
3. Place the drive clutch in the clutch compression tool (PN 8700220).
4. Compress the clutch in the compression tool, then secure the chain.
5. Evenly remove the cover fasteners. The cover bushing may be damaged if the cover is side-loaded or mis-aligned.
6. Carefully remove the tension from the compression tool.
7. Remove the cover and inspect the cover bushing. Replace if damaged or worn.

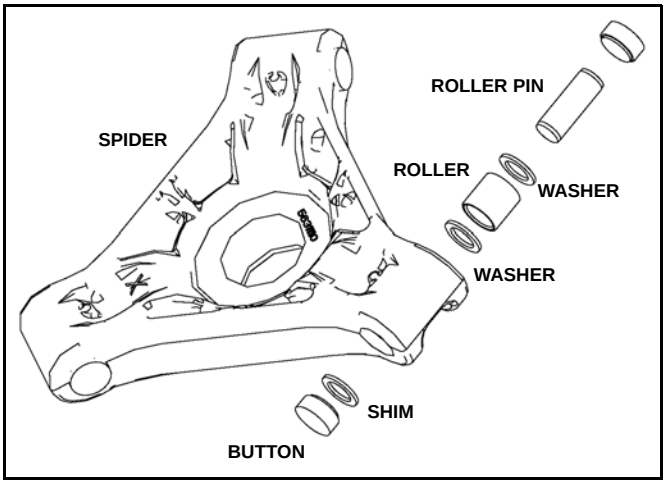
NOTE: Replace the cover bushing if the inside diameter is over 1.40″ (28.95mm)

8. Remove the spring.
9. Mount the drive clutch securely in a drive clutch holding fixture (PN 2871358).
10. Remove the jam nut in a counterclockwise direction (standard thread) using the drive clutch spider nut socket (PN 2871358).
11. Install the spider removal tool (PN 2870341), and remove the spider in a counterclockwise direction (standard thread).
12. Measure the total thickness of the spacer washers that are installed on top of the clutch spacer. Record the thickness of these spacer washers.
13. Inspect both sheave surfaces for wear or damage.
14. Inspect the moveable sheave bushing for wear or damage.
15. Remove all three drive clutch weights.
16. Inspect each weight. The surface should be smooth, with no waves or galling. Place bolt inside weight to check flyweight bushing and pin surface for wear by rocking the weight back and forth.
17. Inspect all the rollers, bushings and roller pins by pulling a flat metal rod across the roller.
18. Roller can also be inspected by rolling with a finger to feel for flat spots, roughness, or loose bushing.

NOTE: The flyweight bushing is not replaceable. If flyweight bushing is damaged both the flyweight, pin and nut will need to be replaced.

19. Inspect to see if the roller and bushing are separating.
20. Bushing must fit tightly in roller.
21. Replace roller and pin if roller fails to roll smoothly (no flat spots) or if the bushing is loose or worn.

Roller Removal

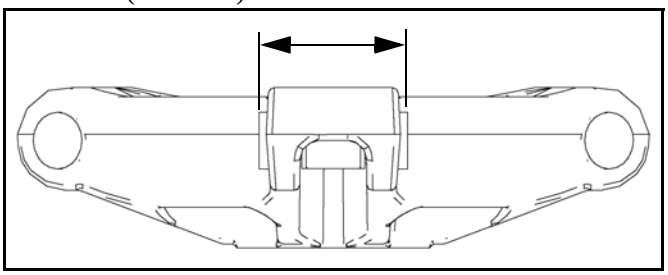


1. With the spider in a vise start removing the spider buttons by drilling a 0.18" hole in the center of a button on one side of the spider.
2. Place spider on a vise or in an arbor press.
3. Place a pin punch through the spider button hole and drive the opposite button and pin out.
4. Remove shims (if any are installed) and note their location.
5. Flip the spider over and tap out the holed button.

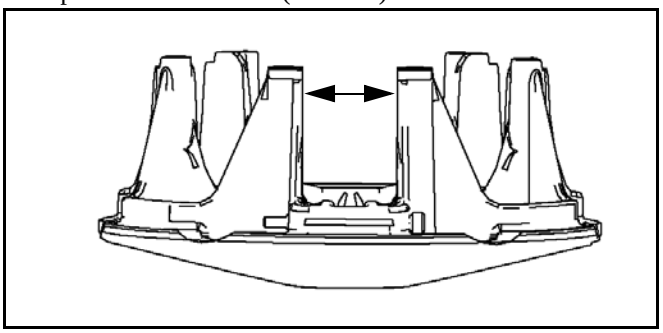
Roller Installation

NOTE: Use care to start the pin straight. Aluminum burrs could pass through into the roller bushing causing it to bind and stick. Also use care to make sure the roller remains aligned when the pin is driven through. The roller busing could be damaged causing premature wear and roller failure.

1. Drive pin into the spider leg.100" -.125" (0.25 - 0.32cm) beyond the first land of the spider leg.
2. Install one washer on the portion of the pin that is protruding from the spider leg.
3. Install new buttons into the spider
4. Place roller in spider leg and center it on the pin.
5. Place a second washer on the other side of the roller.
6. Place the spider on a vise.
7. Install pin centering tool (PN 2870401).
8. Drive the roller pin through the second land of the spider.
9. Repeat process for the other two rollers.
10. Measure the width of the spider leg with the buttons installed (9) and record the measurement. Specification is 1.496" (37.99mm).



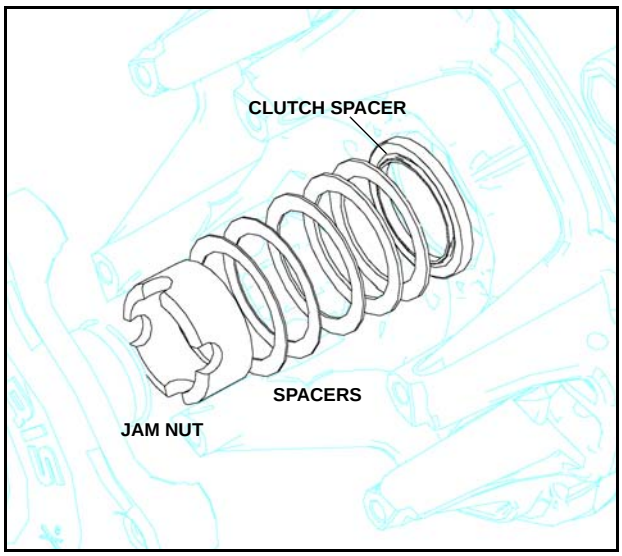
11. Measure the width of the moveable sheave towers. Specification is 1.50" (38.1mm).



12. Subtract the spider measurement form the tower measurement. The clearance between the spider buttons and the moveable sheave towers is .002" - .004" (.05 - .10mm).

Clutch Assembly

1. Assemble the rollers, bushings and roller pins if they were removed.
2. Install the head of the weight pin so that it is on the leading side of rotation. This will orientate the nut on the trailing side of rotation.
3. Torque weight pin to 30 in-lb. (3Nm).
4. Place the moveable sheave onto the stationary sheave.
5. Place the same number of spacers on top of the stepped spacer onto the shaft of the stationary sheave.



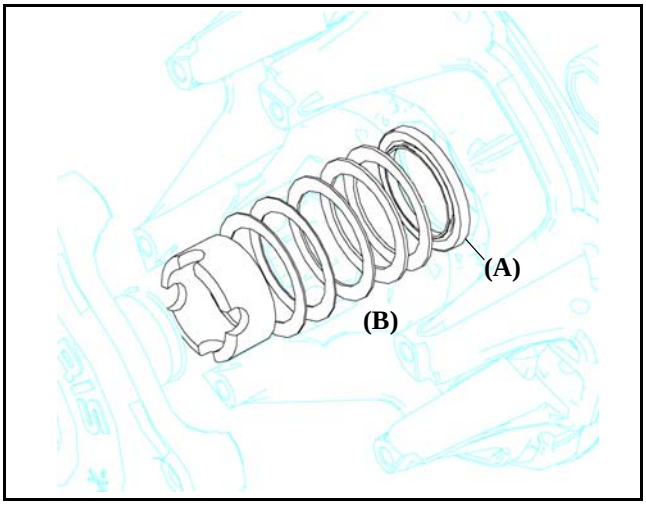
6. Thread the spider onto the stationary sheave shaft.
7. Index the spider. See “Spider Indexing” on page 6.18.
8. Using the spider tool (PN 2870341) torque to 200 ft.-lb. (276Nm).
9. Install the jam nut (6) onto the shaft and torque it to 235 ft.-lb. (324 Nm).
10. Place the drive spring on the shaft.
11. Place the cover onto the clutch and torque the cover fasteners to 90 in-lb. (10Nm).

NOTE: Do not allow side loading or mis-alignment of the cover or the bushing may become damaged.

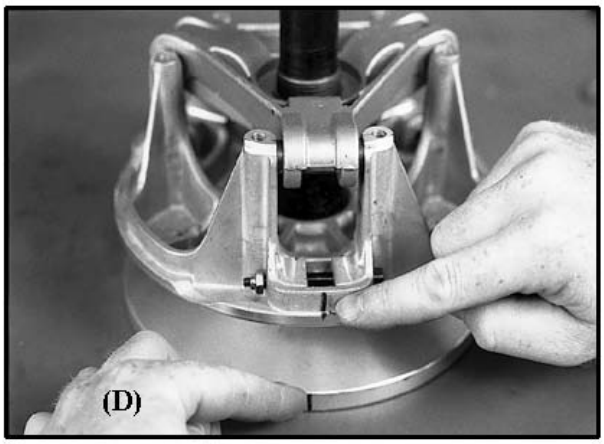
Spider Indexing

NOTE: Spider indexing effects belt to sheave clearance and clutch balance. Please read all procedures before proceeding.

1. Remove and disassemble clutch
2. Add or remove spider washers as required to achieve desired belt to sheave clearance. Make sure that the stepped washer (A) is on the bottom of the spacer stack (B). For example: If belt to sheave clearance is .020″ too large, removing one .020″ shim will position the movable sheave closer to the fixed sheave reducing belt to sheave clearance by .020″.
3. Place the correct number of spacer washers (B) beneath the spider. The following washers are available for fine tuning:
   - 5210752 - .020″ (.51mm)
   - 5242981 - .025″ (.63mm)
   - 5210753 - .032″ (.81mm)
   - 5210754 - .050″ (1.27mm)
   - Clutch Spacer - .130″ (3.3mm)



4. Install spider washer(s) and spider aligning the “X” with the moveable sheave’s “X”. Notice as the spider seat location is changed, the sheave marks made before disassembly no longer align (C). There are two ways to bring the sheave marks into alignment.



Vary the amount and thickness of spacer washers (washer thickness may vary slightly). Re-index marked spider leg to another tower. This can be done because spider has little effect on overall clutch balance.

Re-indexing the spider 1/3 turn clockwise, or 1 leg, will allow the realignment of the moveable and stationary sheaves as previously marked (D). For EXAMPLE: 0.020" or 0.032" (0.5 - 0.8mm) washer removed - re-index spider clockwise 1/3 turn.

NOTE: Alignment marks on the sheaves should be with in 1" (25.4mm) after final assembly and torquing.

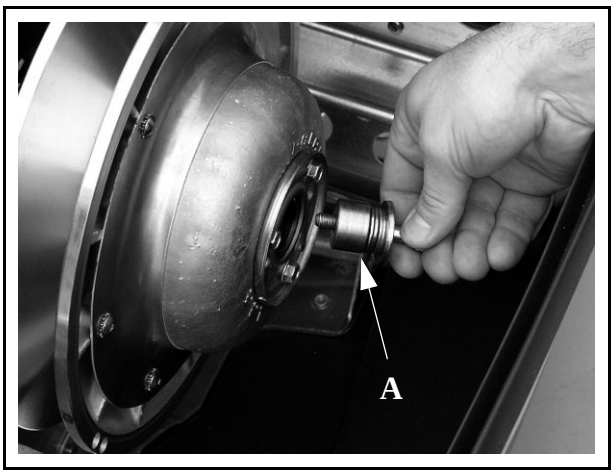
Drive Clutch Installation

NOTE: Always clean the clutch taper before re-installing clutch on engine.

1. Place a clutch taper reamer (PN 2870576) in a vise and lubricate the cutting edges with cutting oil. Clean the clutch taper by manually rotating the clutch clockwise on the reamer one or two revolutions. Only use the weight of the clutch and do not push down on the clutch while turning.
2. Check crankshaft taper for galling or scoring. If necessary clean the taper evenly with 200 grit emery cloth.
3. The clutch taper and the crankshaft taper should be clean and dry. Do not use harsh cleaners which may cause clutch taper to corrode, or damage the crank seal.
4. Clean clutch taper with lacquer thinner or isopropyl alcohol.
5. Slide clutch onto crankshaft taper.
6. Install the retaining bolt with all spacers and washers or o-rings that were on the bolt when it was removed.
7. Hold the clutch with the holding wrench PN 931417-A.
8. Torque bolt to specification.
9. Run engine then re-torque the retaining bolt to specification.

DRIVEN CLUTCH

Driven Clutch Removal

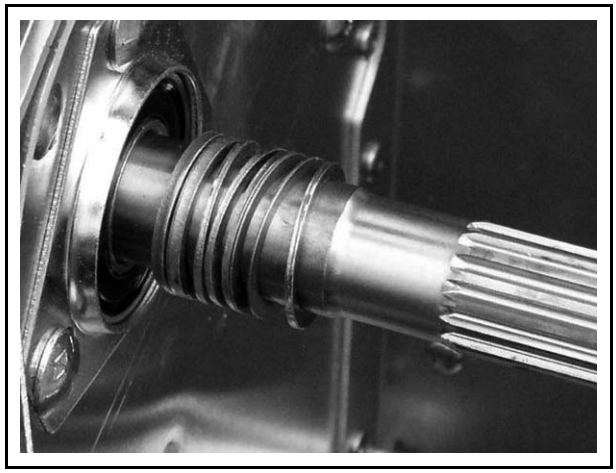


1. Remove the drive belt.
2. Apply and lock the parking brake.
3. Remove the driven clutch bolt and washers (A).

NOTE: Count the number and location of the spacer washers located on the fastener and behind the clutch.

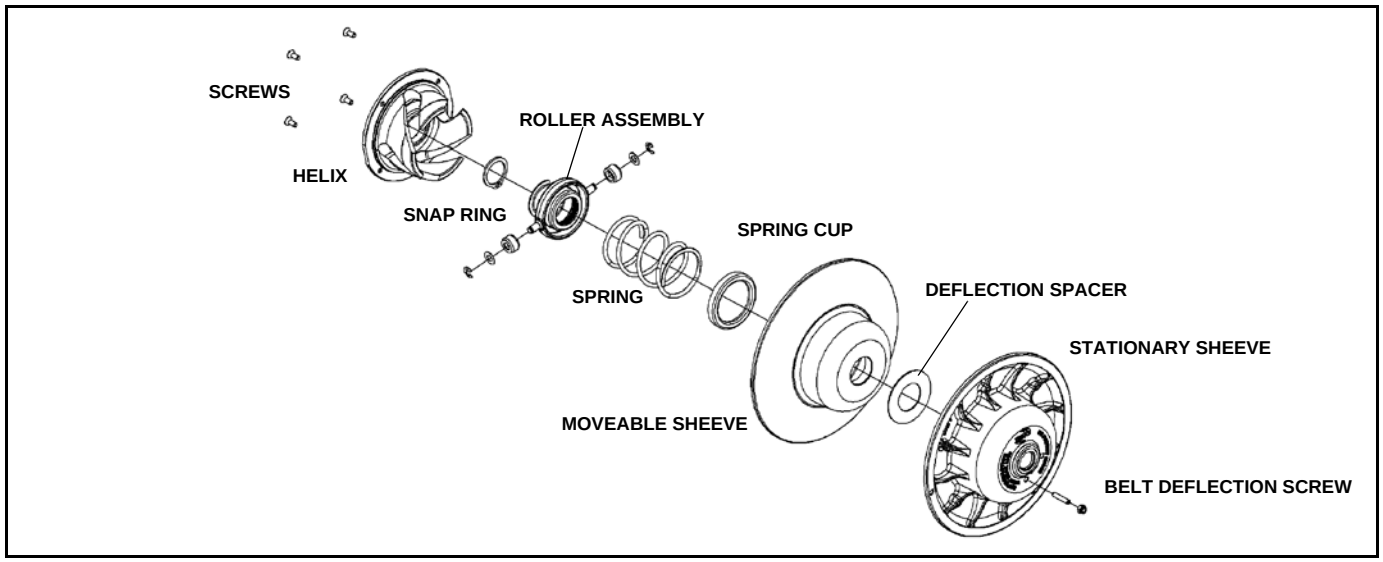
4. Slide the driven clutch off the jackshaft.
5. Inspect the splines and replace jackshaft if damage is found.

Driven Clutch Installation



1. Install the driven clutch bolt with the same amount of washers at removal.
2. Torque the bolt to specification.
3. Check for correct belt deflection.

Team LWT Components



= T
Helix Fasteners = 60 - 80 In.Lbs. (7 - 9 Nm) Driven Clutch Retaining Fastener = 17 Ft.Lbs. (23 Nm)

Disassembly and Assembly Process

1. Remove the screws from the helix, then carefully pry the helix out of the moveable sheave.
2. Install the clutch in the clutch compressor fixture, PN 8700220. Install the extensions, PN PS-45909.
3. Wearing eye protection, carefully compress the roller assembly to gain access to the snap ring. Remove the snap ring.
4. Slowly release the fixture arm to remove the roller assembly and spring. Disassembly the clutch sheaves.
5. Inspect the sheaves for abnormal wear. Clean sheave faces with a Scotch Brite pad and a solution of warm, soapy water.
6. Inspect spring, spring cup, spacer and rollers for wear and replace as required.
7. To assemble the clutch, slide the components back on to the stationary sheave shaft.
8. Align the notch in the roller assembly with row of double splines on the shaft. Slowly compress the spring and roller assembly down on to the shaft. Install the snap ring making sure it is fully seated in the groove.
9. Install the helix by aligning the rollers with the ramps. Push the helix down into the sheave while keeping the screws holes aligned.
10. Install and torque helix fasteners to 60 - 80 in. lbs. (7 - 9 Nm).

CHAPTER 7

Drive and Brake Systems

GEAR RATIO SPEED CHART 7.2
CHAINCASE SPEED CHARTS 7.2
GEARS AND DRIVE CHAINS 7.4
DRIVE GEARS 7.4
DRIVE CHAINS 7.4
7.92 C.D. CHAINCASE 7.5
ASSEMBLY VIEW 7.5
CHAINCASE REMOVAL 7.6
CHAINCASE INSTALLATION 7.6
CHAINCASE SEAL & BEARING REPLACEMENT 7.7
DRIVESHAFT AND JACKSHAFT 7.8
ASSEMBLY VIEW 7.8
JACKSHAFT REMOVAL 7.9
JACKSHAFT INSTALLATION 7.9
DRIVESHAFT REMOVAL / INSTALLATION 7.9
BRAKE SYSTEM 7.10
OVERVIEW 7.10
COMPENSATING PORT 7.10
GENERAL GUIDELINES 7.11
BRAKE FLUID REPLACEMENT & BLEEDING 7.11
MASTER CYLINDER / LEVER SERVICE 7.12
BRAKE HOSE REPLACEMENT 7.13
CALIPER REPLACEMENT 7.13
CALIPER ASSEMBLY 7.13
BRAKE PAD REPLACEMENT 7.13
BRAKE DISC REPLACEMENT 7.13

GEAR RATIO SPEED CHART

Chaincase Speed Charts

Top Gear	25	25	25	25	24	24	24	24	24	23	23	23	23	22	22	22	22	21
Bottom Gear	37	38	40	41	37	38	39	41	42	38	39	42	43	37	39	40	43	37
7.92	74	74	76	76	74	74	74	76	76	74	74	76	76	72	74	74	76	72
Gear Ratio	1.48	1.52	1.60	1.64	1.54	1.58	1.63	1.71	1.75	1.65	1.70	1.83	1.87	1.68	1.77	1.82	1.95	1.76
Jackshaft RPM	MPH																	
6000	87	85	81	79	84	81	79	75	74	78	76	71	69	77	73	71	66	73
6250	91	88	84	82	87	85	83	79	77	81	79	74	72	80	76	74	69	76
6500	94	92	87	85	91	88	86	82	80	84	82	76	75	83	79	77	71	79
6750	98	95	91	88	94	92	89	85	83	88	85	79	78	86	82	80	74	82
7000	102	99	94	92	98	95	93	88	86	91	89	82	80	89	85	83	77	85
7250	105	102	97	95	101	98	96	91	89	94	92	85	83	93	88	86	80	88
7500	109	106	101	98	104	102	99	94	92	97	95	88	86	96	91	89	82	91
7750	112	110	104	101	108	105	102	97	95	101	98	91	89	99	94	92	85	94
8000	116	113	107	105	111	109	106	101	98	104	101	94	92	102	97	95	88	98
8250	120	117	111	108	115	112	109	104	101	107	104	97	95	105	100	97	91	101
8500	123	120	114	111	118	115	112	107	104	110	108	100	98	109	103	100	93	104
8750	127	124	117	115	122	119	116	110	107	114	111	103	101	112	106	103	96	107
9000	131	127	121	118	125	122	119	113	110	117	114	106	103	115	109	106	99	110
9250	134	131	124	121	129	125	122	116	114	120	117	109	106	118	112	109	102	113
9500	138	134	128	124	132	129	126	119	117	123	120	112	109	121	115	112	104	116
9750	141	138	131	128	136	132	129	123	120	127	123	115	112	125	118	115	107	119
10,000	145	141	134	131	139	136	132	126	123	130	127	118	115	128	121	118	110	122

Top Gear	21	21	21	20	20	20	20	19	19	19	19	19	18	18	18	18	17	17	17	17	17
Bottom Gear	40	41	43	37	38	41	42	38	39	41	42	43	39	40	42	43	37	39	40	41	43
7.92	74	74	76	72	72	74	74	72	72	74	74	74	72	72	74	74	70	72	72	72	74
Gear Ratio	1.90	1.95	2.05	1.85	1.90	2.05	2.10	2.00	2.05	2.16	2.21	2.26	2.17	2.22	2.33	2.39	2.18	2.29	2.35	2.41	2.53
Jackshaft RPM	MPH																				
6000	68	66	63	70	68	63	61	64	63	60	58	57	59	58	55	54	59	56	55	53	51
6250	70	69	66	73	71	65	64	67	65	62	61	59	62	60	58	56	62	59	57	56	53
6500	73	72	68	75	73	68	66	70	68	65	63	62	64	63	60	58	64	61	59	58	55
6750	76	74	71	78	76	71	69	72	71	67	66	64	67	65	62	61	67	63	62	60	57
7000	79	77	73	81	79	73	72	75	73	70	68	66	69	68	64	63	69	66	64	62	59
7250	82	80	76	84	82	76	74	78	76	72	70	69	72	70	67	65	72	68	66	65	62
7500	85	83	79	87	85	79	77	81	78	75	73	71	74	72	69	67	74	70	68	67	64
7750	87	85	81	90	88	81	79	83	81	77	75	74	77	75	71	70	76	73	71	69	66
8000	90	88	84	93	90	84	82	86	84	80	78	76	79	77	74	72	79	75	73	71	68
8250	93	91	87	96	93	86	84	89	86	82	80	78	82	80	76	74	81	77	75	73	70
8500	96	94	89	99	96	89	87	91	89	85	83	81	84	82	78	76	84	80	78	76	72
8750	99	96	92	102	99	92	89	94	92	87	85	83	87	85	81	79	86	82	80	78	74
9000	101	99	94	104	102	94	92	97	94	90	87	85	89	87	83	81	89	84	82	80	76
9250	104	102	97	107	105	97	95	99	97	92	90	88	92	89	85	83	91	87	84	82	79
9500	107	105	100	110	107	100	97	102	99	95	92	90	94	92	87	85	94	89	87	85	81
9750	110	107	102	113	110	102	100	105	102	97	95	93	97	94	90	88	96	91	89	87	83
10,000	113	110	105	116	113	105	102	107	105	100	97	95	99	97	92	90	99	94	91	89	85

GEARS AND DRIVE CHAINS

Drive Gears

PART NUMBER	DESCRIPTION
3221107	16T. 3/4W, 15 SPL, HYVO, PM
3221093	17T, 3/4W, 15 SPL, HYVO, PM
3221094	18T, 3/4W, 15 SPL, HYVO, PM
3221095	19T, 3/4W, 15 SPL, HYVO, PM
2900003	19T, 3/4W, 15 SPL, HYVO, CM
3221096	20T, 3/4W, 15 SPL, HYVO, PM
2900004	20T, 3/4W, 15 SPL, HYVO, CM
3221097	21T, 3/4W, 15 SPL, HYVO, PM
2900005	21T, 3/4W, 15 SPL, HYVO, CM
3221098	22T, 3/4W, 15 SPL, HYVO, PM
3221099	23T, 3/4W, 15 SPL, HYVO, PM
3221101	24T, 3/4W, 15 SPL, HYVO, PM
3221102	25T, 3/4W, 15 SPL, HYVO, PM
2900009	25T, 3/4W, 15 SPL, HYVO, CM
3222127	26T, 3/4W, 15 SPL, HYVO, PM
3222126	36T, 3/4W, 15 SPL, HYVO, PM
2900010	37T, 3/4W, 15 SPL, HYVO, CM
3222125	37T, 3/4W, 15 SPL, HYVO, PM
2900144	37T, 3/4W, 15 SPL, HYVO, LW
3222129	38T, 3/4W, 15 SPL, HYVO, PM
2900143	38T, 3/4W, 15 SPL, HYVO, LW
3222108	39T, 3/4W, 15 SPL, HYVO, PM
2900012	39T, 3/4W, 15 SPL, HYVO, CM
2900142	39T, 3/4W, 15 SPL, HYVO, LW
3222099	40T, 3/4W, 15 SPL, HYVO, PM
2900141	40T, 3/4W, 15 SPL, HYVO, LW
3222101	41T, 3/4W, 15 SPL, HYVO, PM
2900140	41T, 3/4W, 15 SPL, HYVO, LW
2900139	42T, 3/4W, 15 SPL, HYVO, LW
2900016	43T, 3/4W, 15 SPL, HYVO, CM
3221188	43T, 3/4W, 15 SPL, HYVO, PM
2900138	43T, 3/4W, 15 SPL, HYVO, LW
3222126	45T, 3/4W, 15 SPL, HYVO, LW

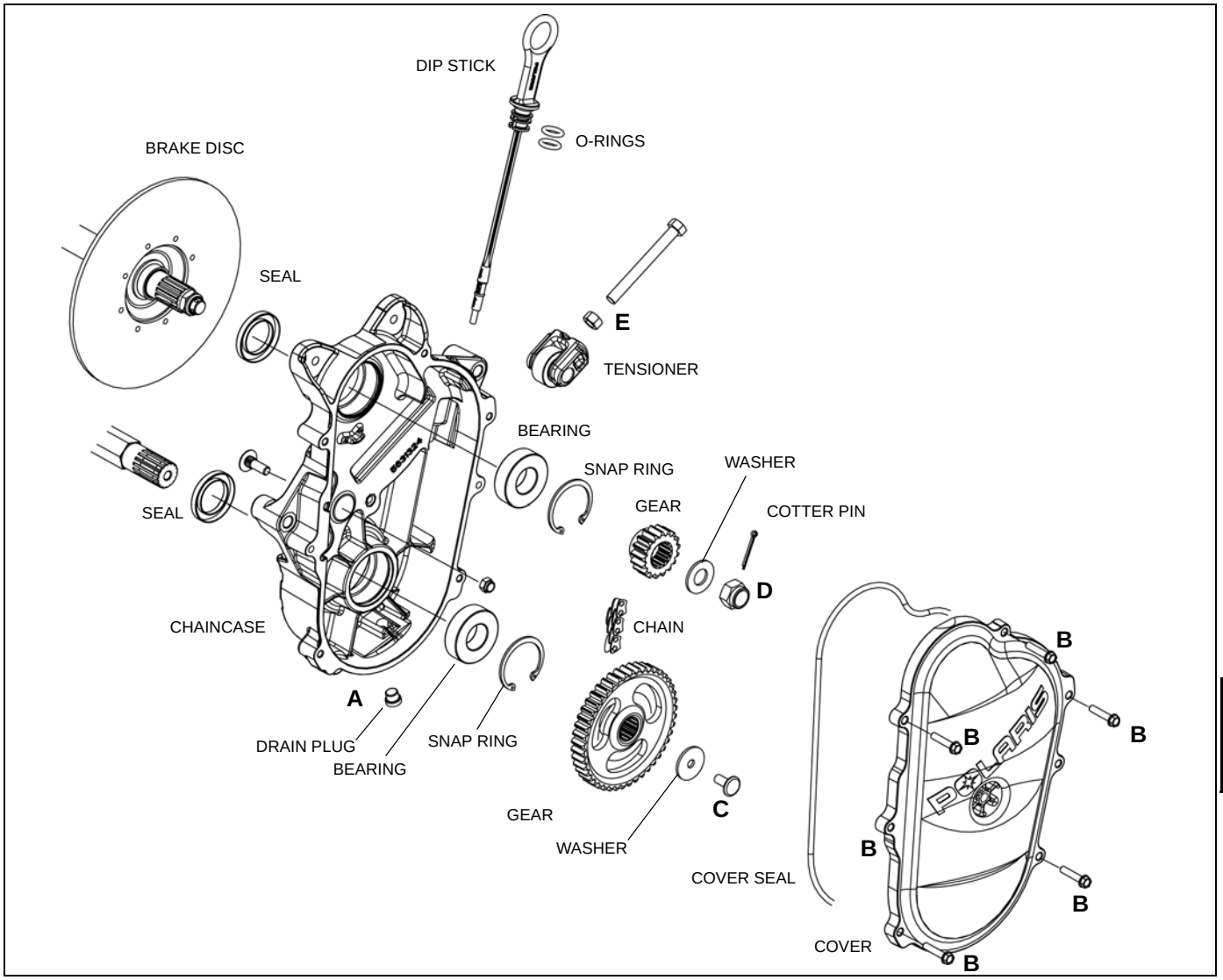
NOTE: CM = Cut Metal / PM = Powder Metal / LW = Lightweight

Drive Chains

PART NUMBER	DESCRIPTION
3221114	64P, 3/4W, HYVO CHAIN
3221113	66P, 3/4W, HYVO CHAIN
3221112	68P, 3/4W, HYVO CHAIN
3221115	70P, 3/4W, HYVO CHAIN
3221110	72P, 3/4W, HYVO CHAIN
3221109	74P, 3/4W, HYVO CHAIN
3221108	76P, 3/4W, HYVO CHAIN
3222110	78P, 3/4W, HYVO CHAIN

7.92 C.D. CHAINCASE

Assembly View



= T
A = 10 Ft.Lbs. (12 Nm) B = 8 Ft.Lbs. (11 Nm) C = 19 Ft.Lbs. (26 Nm) D = 50 Ft.Lbs. (62 Nm) E = 23 Ft.Lbs. (31 Nm)

⚠ WARNING

Incorrect chain tension may cause the chain to break which may result in the loss of braking control.

⚠ CAUTION

Never re-use Cotter pins. Always replace with new parts.

Incorrect chain tension may cause the chain to break, causing severe chaincase damage.

Installing gear sets not listed on the Gear Ratio Speed chart may cause premature gear / chain wear.

NOTE: Install lower gear washer with beveled side out.

Chaincase Removal

1. Support the rear of the machine and loosen up the track tension.
2. Remove RH side panel.
3. Remove the exhaust system.
4. Remove the plenum.
5. Remove drain plug and drain the chaincase fluid.
6. Once fluid is drained replace drain plug and torque to specification.

= T
Drain Plug: 10 ft.lb (12 Nm)

7. Remove driveshaft retaining nuts.
8. Remove the Torx™ screw that holds on the cowling on the LH side.
9. Remove the Torx™ screws that hold the oil/coolant bottles to the bracket.
10. Move the RH cowling away from the footrest.
11. Apply the parking brake.
12. Tip machine over on its LH side.
13. Remove the chaincase cover and clean it.
14. Remove the lower gear.
15. Remove the cotter pin on the jackshaft.
16. Remove the castle nut and washer on the jackshaft (upper sprocket).
17. Release the parking brake.
18. Release the tension on the chaincase tensioner.
19. Remove the sprockets and chain from the chaincase.
20. Remove the brake caliper bolts.
21. Push the coolant hose enough to remove the caliper out of the way of the chaincase.
22. Remove the rear suspension.
23. Carefully slide the driveshaft down so that it clears the chaincase, and remove the driveshaft.
24. Remove the track from the chassis.
25. Remove the chaincase retaining bolts.
26. Slide the chaincase out of the chassis.
27. Inspect the o-ring and seal sleeve on the jackshaft and replace the o-ring.
28. Service the chaincase.

Chaincase Installation

1. Install the seal sleeve and o-ring onto jackshaft. The seal sleeve goes on first then the o-ring.
2. Install jackshaft installation tool PN 2871296 onto the jackshaft.This will prevent damage to the seal.
3. Install assembled chaincase onto the jackshaft in chassis.
4. Insert carriage bolts through the back side of the chassis and install the Nylock nuts loosely.
5. Insert the track.
6. Insert the driveshaft and careful guide it through the lower bearing of the chain case.
7. Loosely install the lower sprocket on the drive shaft with the retaining bolt. This will keep the driveshaft from falling through the other side.
8. Install the rear suspension.
9. Tip machine over so that it is upright.
10. Support the rear of the machine with a jack stand.
11. Center the track so that it is contacting the drive shaft drivers correctly.
12. Remove the jackshaft installation tool from he jackshaft.
13. Install the jackshaft alignment tool on jackshaft and torque enough so that the jackshaft is aligned with the chaincase bearing.
14. Torque all chaincase retaining bolts to specification.

= T
Chaincase Bolts: 28 ft.-lb. (38 Nm)

15. Remove the jackshaft alignment tool from jackshaft.
16. Install brake caliper and torque the retaining bolts to specification.

= T
Brake Caliper Bolts: 19-21 ft.-lb. (26-28 Nm)

17. Install the driveshaft by replacing the flange nuts on the drive side. Torque to specification.

= T
Driveshaft Flange Nuts: 17 ft.-lb. (23 Nm)

18. Torque the jackshaft flange nuts to specification.

= T
Jackshaft Flange Nuts: 17ft-lb. (23 Nm)

19. Remove the loosely placed lower gear and retaining bolt.
20. Place the upper sprocket, lower sprocket into the chain, and install it onto the shafts in the chaincase.

21. Lock the parking brake.
22. Replace the top sprocket retaining nut. Torque to 50 ft-lb.

= T
Top Sprocket Nut: 50 ft.lb. (6 8N-m)

23. Install cotter pin and bent the ends around the jackshaft end.
24. Install the lower sprocket retaining bolt. Torque to 19-21 ft-lb.(26-28 N-m).

= T
Bottom Sprocket Bolt: 19-21 ft.lb. (26-28 N-m)

25. Release the parking brake.
26. Adjust the chain tensioner by hand and back off 1/4 turn.
27. Lock the adjuster lock nut.
28. Install the chaincase cover, and torque the cover bolts to specification.

= T
Chaincase Cover Bolts: 8 ft.lb. (11 Nm)

29. Remove the dipstick and fill chaincase with Polaris 80W Synthetic Chaincase Lubricant.
30. Check for leaks.
31. Adjust track tension to the specified tension.
32. Reinstall the chassis components and exhaust system.

Chaincase Seal & Bearing Replacement

1. Remove the chaincase as described above.
2. Pry out the old seals from the back side of the chaincase.
3. Remove bearing retaining snap rings.
4. Press out the old bearings from the back side of the chain case so that the bearings drop out of the front. If the bearing pushes out hard, warm the area to expand the chaincase bore slightly.

NOTE: ***When removing always push out the bearing towards the snap ring side of the chaincase.***

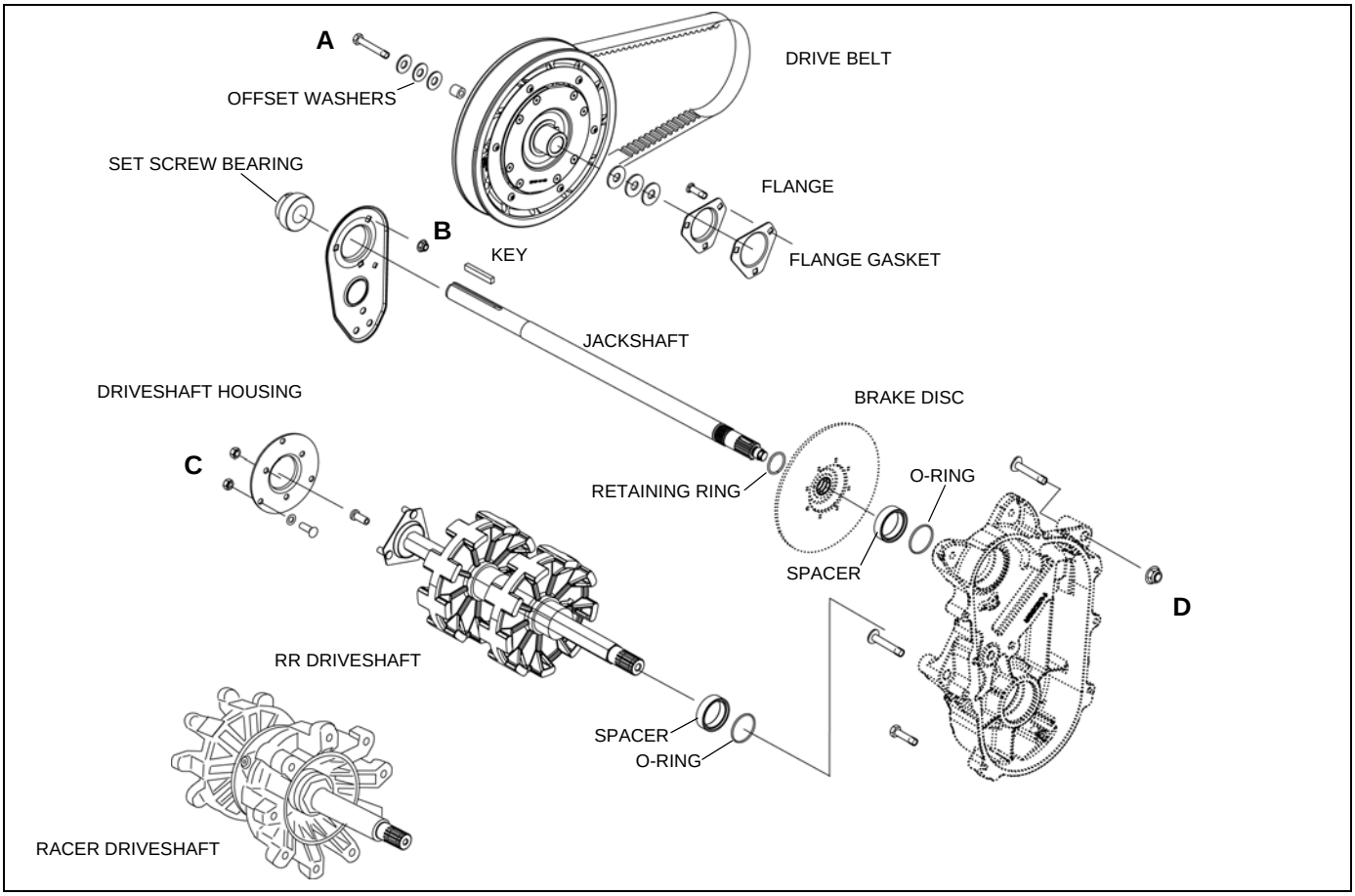
5. Clean the chaincase.
6. Apply Loctite® 680 to the outer race of the new bearings and press them into the chaincase from the snap ring side.

NOTE: ***Press on the bearing outer race only, or damage may occur to bearing.***

7. Replace the snap rings (12, 18).
8. Press in new seals (14, 15) in the back of the chaincase until the outer edge of the seal is flush with the chaincase shoulder

DRIVESHAFT AND JACKSHAFT

Assembly View



= T
A = Driven Clutch Fastener = 17 Ft.Lbs. (23 Nm)
B = Jackshaft Flange Nuts = 17 Ft.Lbs. (23 Nm)
C = Driveshaft Housing Nuts = 17 Ft.Lbs. (23 Nm)
D = Chaincase Mounting Nuts = 28 Ft.Lbs. (38 Nm)

CAUTION
Do not over-torque the chaincase mounting nuts.

NOTE: Set driven clutch offset following procedure in the PVT System Chapter.

Lubricate components as outlined in the Periodic Maintenance Table.

Tighten chaincase mounting nuts using a criss-cross pattern.

Install jackshaft / driveshaft seal sleeve with beveled edge towards brake disc, then install o-ring inside sleeve.

Racer "slip" driveshaft components are not serviceable.

Jackshaft Removal

1. Drain the chaincase oil into an appropriate container.
2. Remove the drive belt.
3. Remove the driven clutch, noting the number and location of the driven clutch offset washers.
4. Remove the chaincase cover.
5. Relieve tension on the chain tensioner.
6. Remove the cotter pin on the jackshaft.
7. Lock the parking brake and remove the nut on the top gear.
8. Remove the lower gear fastener.
9. Remove the upper gear, lower gear and chain from the chaincase.
10. Remove the jackshaft flange from the driven clutch side of the jackshaft.
11. Hold the brake disc and slide the jackshaft out through the flange side.
12. Inspect drive shaft and jackshaft in bearing contact area. If diameter is .001, (.025 mm) less than non-contact area, shaft, replace the jackshaft.

Jackshaft Installation

1. Insert the jackshaft through the brake disc and chaincase bearing.
2. Install the chassis flange at the driven clutch side of the jackshaft. Torque the flangette fasteners to specification.

= T
Jackshaft Flange Nuts: 17 ft-lb (24 Nm)

3. Install the upper gear, lower gear and chain into the chaincase.
4. Torque the lower gear fastener to specification.

= T
Lower Gear Fastener 19 ft-lb (26Nm)

5. Torque the upper gear fastener to specification.

= T
Upper Gear Castle Nut: 50 ft-lb (68Nm)

6. Insert the cotter pin and bend the edges around the nut flats.
7. Adjust the chain tensioner until there is .25-.375" (.6-.95cm) chain deflection.
8. Install the chaincase cover, and torque the cover fasteners to specification.

= T
Chaincase Cover Fasteners: 8 ft-lb (11Nm)

9. Replace drain plug and fill the chaincase to the safe level of the dip stick.

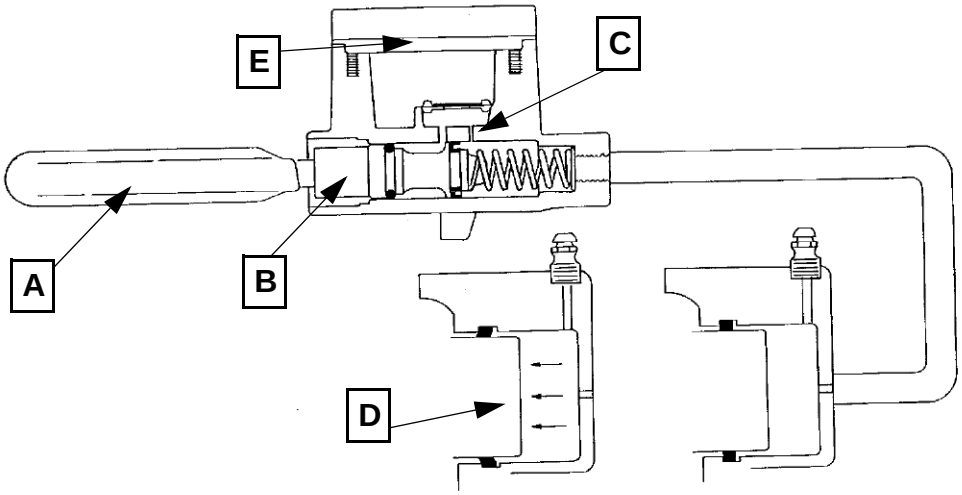
Driveshaft Removal / Installation

1. Turn the fuel petcock to the “OFF” position..
2. Remove the side panels.
3. Remove the exhaust system.
4. Remove the intake plenum.
5. Remove the drain plug and drain the chaincase fluid.
6. Replace the chaincase drain plug and torque to specification.

= T
Drain Plug Torque: 10 ft-lb (12 Nm)

7. Loosen the chain tensioner.
8. Remove the chaincase cover.
9. Remove the lower sprocket bolt and washer.
10. Remove Lower sprocket and chain.
11. Remove the driveshaft bearing housing.
12. Remove the rear suspension.
13. With the sled over on its left side and the rear skid removed, remove the drive shaft.
14. Assemble in reverse order. Follow Torque values as outlined in “Chaincase Installation” earlier in this chapter.

BRAKE SYSTEM



Overview

The Polaris snowmobile hydraulic brake system consists of the following components or assemblies: brake lever, master cylinder, hydraulic hose, brake caliper (slave cylinder), brake pads, and a brake disc which is secured to the drive line.

When the hand activated brake lever (A) is applied, it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening called a compensating port (C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the pistons (D) located in the brake caliper move toward the disc and applies pressure to the moveable brake pads. As the lever pressure is increased, the braking effect is increased.

The friction applied to the brake pads will cause the pads to wear. As the pads wear, the piston within the caliper self-adjusts and moves further outward.

Brake fluid level is critical to proper system operation. A low fluid level allows air to enter the system causing the brakes to feel spongy.

Compensating Port

Located within the master cylinder is a small compensating port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the brake lever is released and the piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion caused by heat, or contraction caused by cooling. During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for the brake fluid to expand. Master cylinder reservoirs should be filled to the top of the fluid level mark on the inside of the reservoir, 1/4" - 5/16" (.6 -.8 cm) below lip of reservoir opening.

This system also incorporates a diaphragm (E) as part of the cover gasket and a vent port (on cover) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Be sure the vent is open and allowed to function. If the reservoir is overfilled or the diaphragm vent is plugged, the expanding fluid may build pressure in the brake system and lead to brake failure.

General Guidelines

⚠ WARNING

An unsafe condition exists when air is trapped in the hydraulic brake system. Air in the brake hydraulic system acts like a soft spring and absorbs a large percentage of the pressure developed by the master cylinder. Without this pressure, the braking system cannot develop full braking force to allow for safe, controlled stops. It is extremely important to bleed the brakes properly after any brake system work has been performed or when inspection reveals spongy brakes.

A soft, spongy feeling in the brake lever and/or brake pedal could indicate a hazardous condition in the brake system. Do not operate the vehicle until the failure in the brake system is corrected.

Keep brake fluid tightly sealed and out of reach of children. Brake fluid can accumulate moisture, reducing it's effectiveness.

Contaminated brake discs or brake pads greatly reduce braking performance and increase stopping distance. Do not attempt to clean contaminated pads. Replace them. Clean the brake disc with brake cleaner.

This brake system requires ethylene-glycol based fluid (DOT 4). Do not use or mix different types of fluid such as silicone-based or petroleum-based.

Do not use brake fluid taken from old, used or unsealed containers. Never reuse brake fluid.

⚠ CAUTION

Pressure bleeding is not recommended. When fluid surges through the fittings, it is possible to cavitate the fluid and create air in the system. In addition, the fluid stored in a pressure bleeder may be contaminated. Always use fresh DOT 4 brake fluid from a sealed container.

Keep these points in mind when bleeding hydraulic brakes:

- The master cylinder reservoirs have limited capacities. It is easy to empty them during the bleeding procedure. This introduces air into the system which you are trying to purge. Watch the reservoir closely and add fluid when necessary to prevent air from entering the system.
- Apply only light to moderate pressure to the lever or pedal when bleeding the brake system. Extreme pressure will cause a surge of fluid through the small orifices of the brake system when the bleeder screw is opened and introduce air into the system by means of cavitation.
- Small amounts of air can become trapped in the banjo bolt fittings at the master cylinder(s) and junction points of brake lines. These fittings can be purged of air by following a standard bleeding procedure at these fittings (instead of the bleed screw on caliper) if necessary to speed the bleeding process. This is usually only needed if system was completely drained of fluid. Bleed each line connection, starting with the fitting closest to the master cylinder, working toward the caliper, and ending with the bleed screw.
- Always torque banjo bolts and other brake system fittings to specified torque.
- Change fluid every 2 years, or when fluid is dark or contamination is suspected.

Brake Fluid Replacement & Bleeding

This procedure should be used to change fluid or bleed brakes during regular maintenance, or after complete brake service. Brake fluid may damage painted or plastic surfaces. Take care not to spill, and wipe up any spills immediately. Cover parts to avoid damage.

1. Clean the reservoir cover.

2. Remove the two T-20 Torx™ screws from the cover.
3. Carefully remove the cover and diaphragm assembly from the reservoir.
4. Under the cover, inspect the vent slots under the bellows and remove any debris or blockage.
5. Bleed or replace the fluid by attaching a clear hose from the caliper bleeder fitting to a clean container. Be sure the hose fits tightly on the bleeder fitting.
6. Pump the brake lever a few times and hold.

7. Slowly open the bleeder fitting and let the old fluid or air escape.
8. Pump the brake lever a few times and hold it again.
9. Repeat steps 7 and 8 until new brake fluid can be seen coming from the caliper bleeder fitting or if bleeding air, repeat this step until only fluid is seen coming out. This may take several intervals.

10. Torque the bleeder screw to specification.

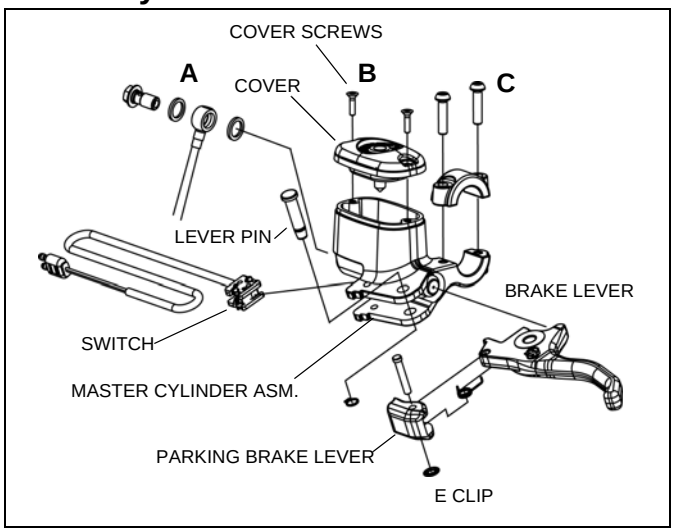
= T
Bleeder Screw: 8 - 11 Ft.Lbs. (11 - 15 Nm)

11. When adding fluid, add DOT 4 brake fluid to 1/4-5/16" (.6-.8 cm) from the reservoir top.
12. Install cover and diaphragm assembly.
13. Tighten the cover screws to specification.

= T
Cover Screws: 6 - 8 In.Lbs. (.7 - .9 Nm)

14. Field test machine before putting into service. Check for proper braking action and lever reserve. Lever reserve is when the lever is firmly applied, the lever reserve should be no less than 1/2" (1.3 cm) from the handlebar.
15. Verify that the sight glass indicates a full reservoir.
16. Check brake system for any fluid leaks.

Master Cylinder / Lever Service



= T
A = Banjo Bolt = 240 - 264 In.Lbs. (27 - 29 Nm) B = Cover Screws = 6 - 8 In.Lbs. (.7 - .9 Nm) C = Handlebar Clamp = 60 - 80 In.Lbs. (6.7 - 9 Nm)

1. To remove the brake lever, remove the e-clip from the lever pin.
2. Extract the pin from the housing, then remove the lever.
3. Disconnect the brake hose from the master cylinder assembly.
4. The master cylinder assembly is not serviceable. Master cylinder reconditioning requires complete replacement.
5. Refill and bleed the brakes system as outlined in this chapter. See “Brake Fluid Replacement & Bleeding” on page 7.11.

Brake Hose Replacement

1. Attach the other end to a Mity Vac or similar vacuum tool.
2. Remove all of the brake fluid.
3. Note the orientation of the brake hose. The brake hose will need to be replaced in the same orientation.
4. Remove the brake hose from the caliper. Cap or cover the end to catch any brake fluid that may still be in the hose.
5. Remove the brake hose from the master cylinder.
6. Install new brake hose on caliper and orientate it as noted in step 3.
7. Torque brake hoe fitting to specification.

= T
Brake Hose Caliper Fitting: 240 - 264 In.Lbs. (27 - 29 Nm)

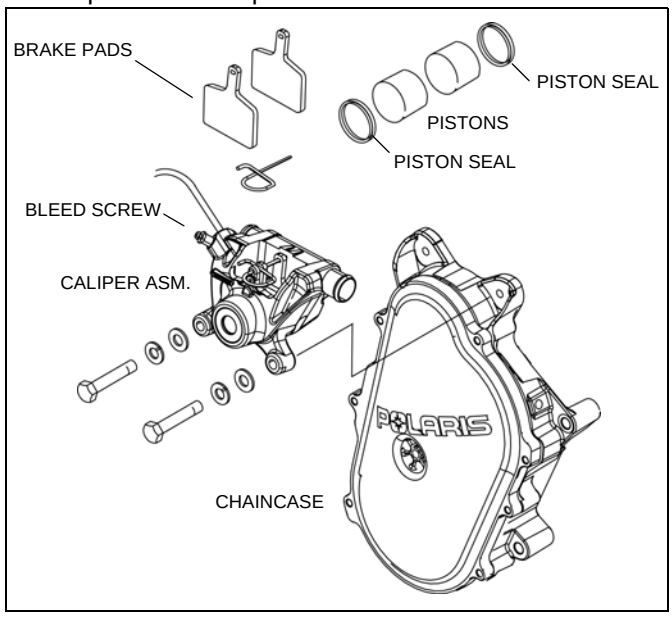
8. Install the new brake hose into the master cylinder using new copper crush washers. Torque the brake hose to specification.

= T
Brake Hose Banjo Bolt 240 - 264 In.Lbs. (27 - 29 Nm)

9. Follow the bleeding procedure. See “Brake Fluid Replacement & Bleeding” on page 7.11.

Caliper Replacement

The only serviceable items in the brake caliper is the brake pads, piston and seals. If any service is required of the caliper a new caliper is available.



1. Note the orientation of the brake hose before removing it.
2. Remove the banjo bolt from the brake hose and tie up so that all the brake fluid does not leak out.
3. Pinch both cooling hoses, then remove from caliper.
4. Remove the caliper assembly from the chaincase.

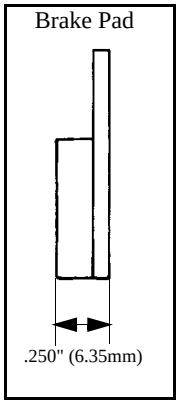
Caliper Assembly

1. Replace caliper bolts and torque to specification.

= T
Caliper Bolts: 18 - 20 Ft.Lbs. (24 - 27 Nm)

2. Reconnect the cooling hoses.
3. Place the brake hose on the caliper in the same orientation as it was before it was removed.
4. Clean the threads of the banjo bolt and the threads in the caliper.
5. Follow Brake Line Replacement. See “Brake Hose Replacement” on page 7.13.
6. Install banjo bolt into the caliper and torque to specification.
7. Bleed the brakes. See “Brake Fluid Replacement & Bleeding” on page 7.11.
8. On a liquid cooled caliper, bleed the cooling system of any trapped air.

Brake Pad Replacement



Brake pads need to be replaced if the total thickness of the pads and backing are less than .250" (6.35mm).

1. Remove brake pad retaining pin.
2. Remove the brake pads.
3. Inspect the brake disc for any wear.
4. Replace brake pads in reverse order of removal.

Brake Disc Replacement

The brake disc should be replaced if the thickness of the disc is below .193"(.49cm).

1. Remove the chaincase.
2. Slide the brake disc from the jackshaft.
3. Check the jackshaft for any damage.
4. Replace the o-ring on the jackshaft
5. Replace the brake disk.
6. Assemble the chaincase.

NOTES

CHAPTER 8

Steering and Suspensions

OVERVIEW / SPECIFICATIONS 8.2
- INSPECTION 8.2
- TOE SPECIFICATIONS 8.2
- SPRINGS 8.2
- SUSPENSION MOUNTING FASTENER TORQUE 8.3
- REAR TRACK SHOCK PIVOT ORIENTATION 8.3
- SKI ASSEMBLY 8.3

FRONT SUSPENSION ASSEMBLY ILLUSTRATIONS 8.4
- 2008 IQ RACER / 600 RR FRONT SUSPENSION 8.4
- IQ RACER / 600 RR STEERING POST 8.5
- 2008 IQ RACER STEERING ASSEMBLY 8.6
- 2008 600 RR STEERING ASSEMBLY 8.7
- HANDLEBAR ASSEMBLY 8.8

ADJUSTMENT PROCEDURES 8.9
- SETUP AND ADJUSTMENTS 8.9
- ALIGNMENT BAR SPECIFICATIONS 8.9
- ROD ENDS 8.9
- ROD END ENGAGEMENT 8.9
- HANDLEBAR CENTERING 8.10
- TOE ADJUSTMENT 8.10

DISASSEMBLY AND ASSEMBLY 8.10
- SPINDLE REMOVAL 8.10
- SPINDLE ASSEMBLY 8.10
- SPHERICAL BEARING REPLACEMENT 8.10
- UPPER / LOWER CONTROL ARM REMOVAL 8.10
- UPPER / LOWER CONTROL ARM INSTALLATION 8.10

REAR SUSPENSION ASSEMBLY ILLUSTRATIONS 8.11
- 2008 RACER / RR PIVOTS AND REAR IDLER 8.11
- 2008 RACER / RR RAIL ASSEMBLY 8.12
- 2008 RACER / RR FRONT AND REAR TORQUE ARMS 8.13

REAR SUSPENSION OPERATION 8.14
- OPERATION 8.14
- WEIGHT TRANSFER 8.14
- COUPLING 8.14

REAR SUSPENSION ADJUSTMENTS 8.15
- ADJUSTMENT PROCEDURES 8.15
- REAR SUSPENSION RIDE HEIGHT 8.15
- SCISSOR STOP ADJUSTMENT 8.15
- LIMITER STRAP ADJUSTMENT 8.16
- TORSION SPRING ADJUSTMENT 8.16

RAIL SLIDERS 8.16
- WEAR LIMIT 8.16
- REMOVAL 8.16
- BREAK-IN 8.17

REAR SUSPENSION REMOVAL AND INSTALLATION 8.17
- REMOVAL 8.17
- INSTALLATION 8.17

OVERVIEW / SPECIFICATIONS

Inspection

When inspecting steering and suspension components for wear or damage, always replace parts as necessary. Refer to the assembly exploded views in this chapter for identification of components and torque values of fasteners. Make notes of the direction a bolt goes through a part, what type of nut is used in an application, etc.

Some of the fasteners used in the IFS are special and cannot be purchased at a hardware store. Always use genuine Polaris parts and hardware when replacing front end components. Review steering adjustment guidelines before making adjustments.

The following components must be inspected at this time.

- Tie rods and tie rod ends
- Torsion bar and bushings / linkage (where applicable)
- Handlebars and steering post assembly
- Spindles and bushings
- Skis and skags
- Idler arms
- A-arms and bushings
- Shock absorbers, shock mounts, springs
- All related fasteners - check torque. Refer to steering exploded views at the beginning of this section.
- Grease all fittings.

Always follow rod end engagement guidelines. Maximum setup width must be checked whenever front suspension components are adjusted or replaced.

Toe Specifications

Toe alignment is measured at ride height. This means that the machine is on the ground and resting at normal ride height, not full rebound. Measure at a point 10" (2.54cm) forward of the ski mount bolt and 10" (2.54cm) behind the ski mount bolt, preferably on the center line of the carbide skags.

Camber & Toe Specifications

SUSPENSION	MAXIMUM SET UP WIDTH in/cm (± .25in/.6cm)	CAMBER in/mm	TOE OUT (At ride height) in/mm
IQ Racer	NOT ADJUSTABLE		0 -.12 0 -3.05
600 RR			

Springs

When the front suspension encounters a bump, the force of the bump compresses the spring. If the bump force is 450 pounds, a 100 #/in. spring will compress 4.5 inches. A 150 #/in. spring will compress 3 inches. If the suspension had 4 inches of spring travel, the 100 #/in. spring would bottom out, while the 150 #/in. spring would have one inch of travel remaining.

- Free length - the length of a coil spring with no load applied to the spring
- Installed length - the length of the spring between the spring retainers. If the installed length of the spring is less than the free length, it will be pre-loaded.
- Spring rate - the amount of force required to compress a coil spring one inch. For example, if 150 pounds of force are required to compress a spring 1 inch, the spring rate would be 150 #/in.
- Straight rate spring - the spring requires the same amount of force to compress the last one inch of travel as the first one inch of travel. For example, if a 150 #/in. spring requires 150 pounds of force to compress it one inch, 300 pounds of force would compress it two inches, 450 pounds of force would compress it three inches, etc.
- Progressively wound spring - the rate of the spring increases as it is compressed. For example, a 100/200 #/in. rate spring requires 100 pounds of force to compress the first one inch, but requires 200 additional pounds to compress the last one inch.

Suspension Mounting Fastener Torque

Component	Torque Specification
Torque Arm-to-Tunnel Fasteners	45 - 55 Ft.Lbs. (61 - 75 Nm)
Front Suspension Shock Fasteners	29 Ft.Lbs. (39 Nm)
Front Track Shock Fasteners	35 Ft.Lbs. (47 Nm)
Rear Track Shock Fasteners	25 Ft.Lbs. (34 Nm)

⚠ CAUTION

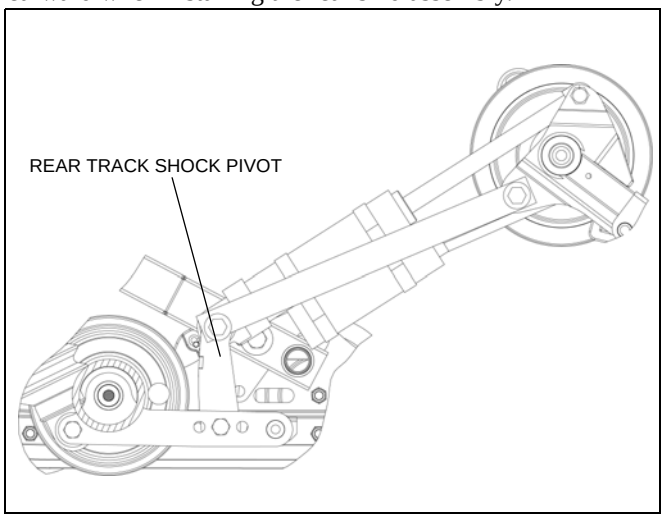
Torque arm fasteners are pre-coated with thread locking agent. Always replace with new fasteners.
Never re-use Nylock nuts. Always replace components with new nuts.

Rear Track Shock Pivot Orientation

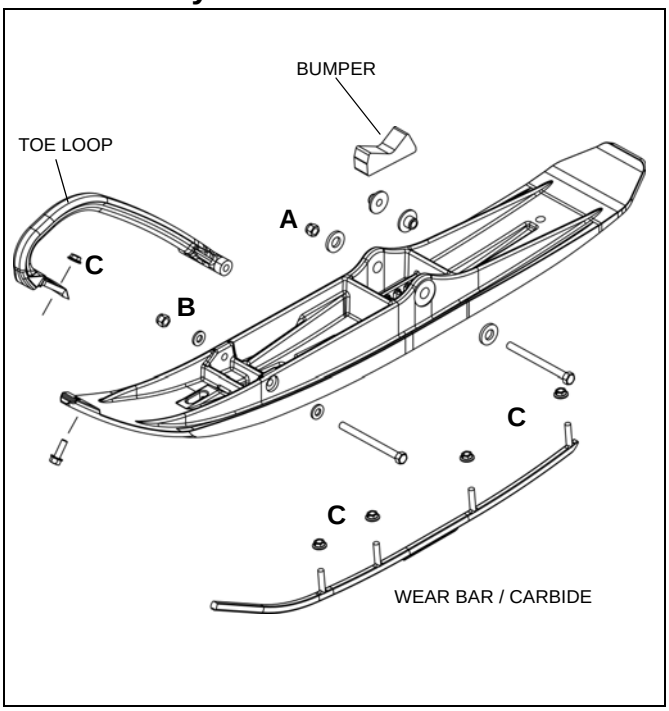
The rear track shock pivot must be properly located on all IQ rear suspensions when installing the rear skid into the tunnel. Failure to properly locate the rear track shock pivot may cause the rear torque arm to lock.

All IQ rear track shock pivots, with the exception of IQ RMK and race suspensions, must be located as shown below. On IQ RMK and race rear suspensions, the shock pivot is orientated upwards.

Always verify the rear torque arm scissor is pushed forward so that it is either straight up (IQ RMK, IQ Shift) or against the FRSS (IQ 121, IQ 136 Coupled, IQ Comfort) and not collapsed rearward when installing the rear skid assembly.



Ski Assembly



⚠ CAUTION

Never re-use lock nuts. Always re-assemble using new lock nuts.

= T

A = 36 Ft.Lbs. (49 Nm)
B = 5 - 7 Ft.Lbs. (7 - 9 Nm)
C = 8 - 10 Ft.Lbs. (11 - 13 Nm)

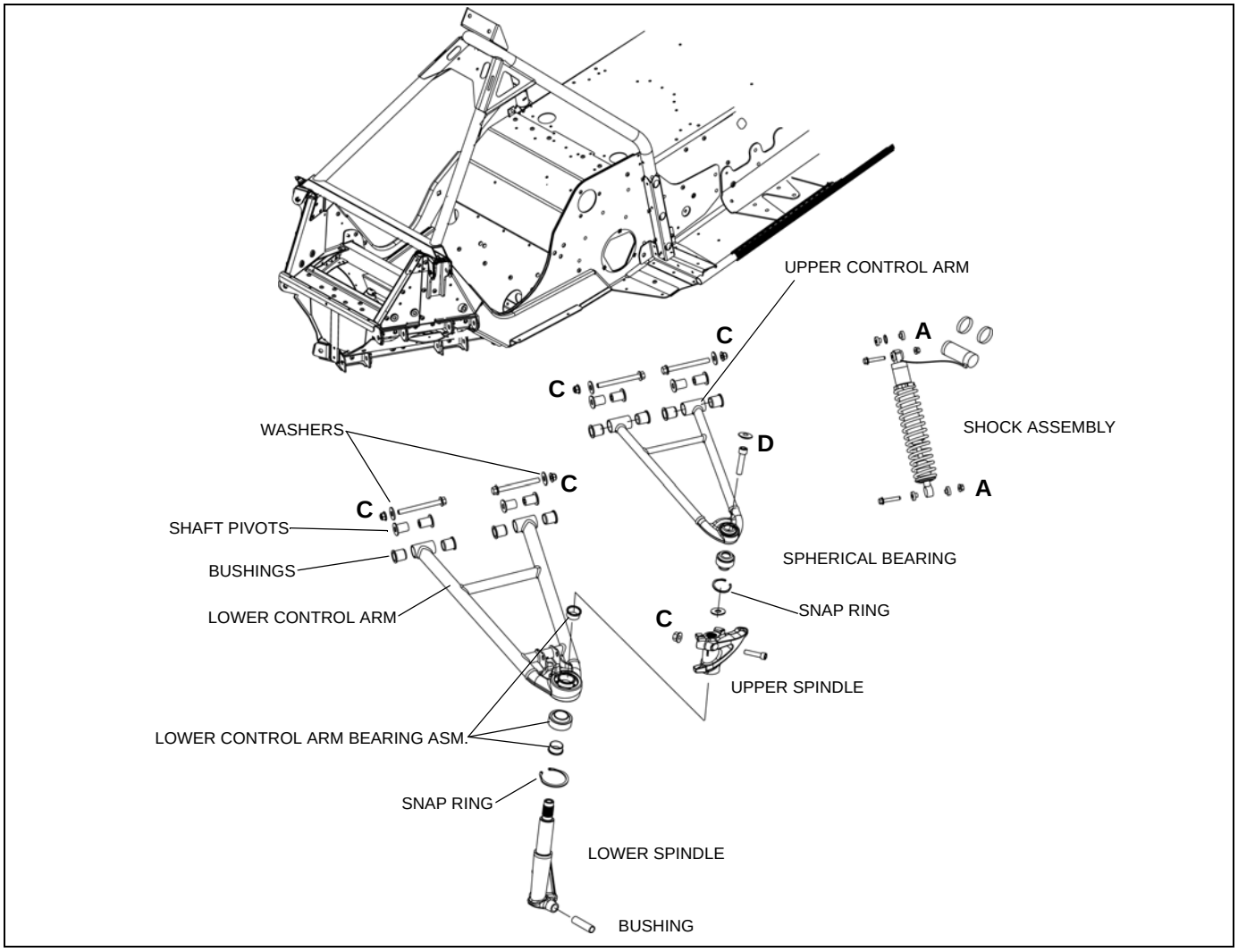
Assembly Notes:

- Install spindle bumper with flat-side facing forward.
- Replace wear bar / carbide when damaged or when carbide edge is worn away.

8

FRONT SUSPENSION ASSEMBLY ILLUSTRATIONS

2008 IQ Racer / 600 RR Front Suspension



NOTE: Assembly Notes

- Note washer installed between fastener and pivot bushing on the rear, lower control arm mount to allow sufficient clearance between nut and sway bar.
- Orientate rod ends so they are parallel with mating component.

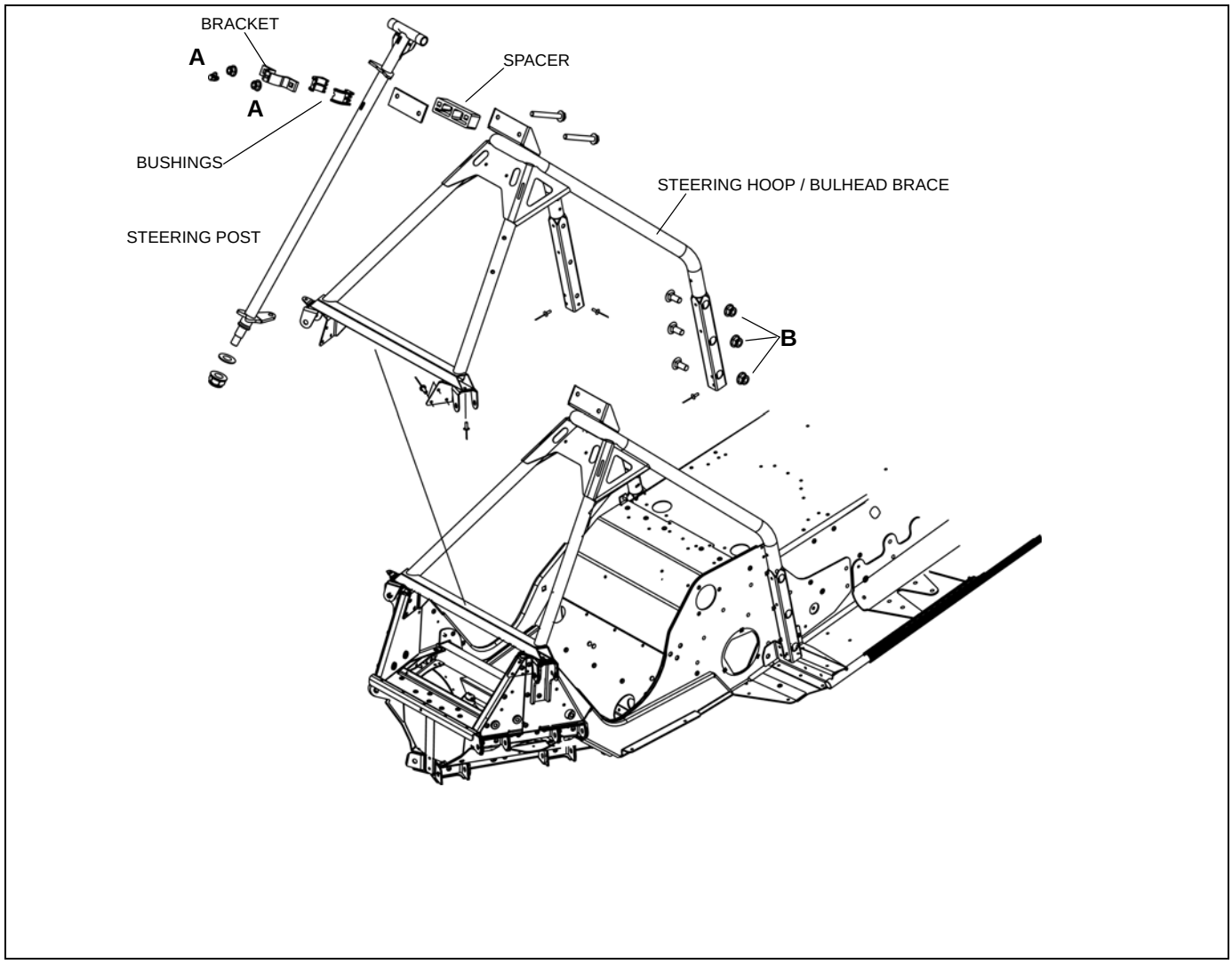
⚠ CAUTION

Never re-use lock nuts. Always re-assemble using new lock nuts.

= T

A = 29 Ft.Lb. (39 Nm) (Shock Mounting Fastener Nuts)
B = 28 Ft.Lbs. (38 Nm) (Tie Rod End Nylock Nuts)
C = 35 Ft.Lb. (47 Nm)
D = 60 Ft.Lb. (81 Nm)

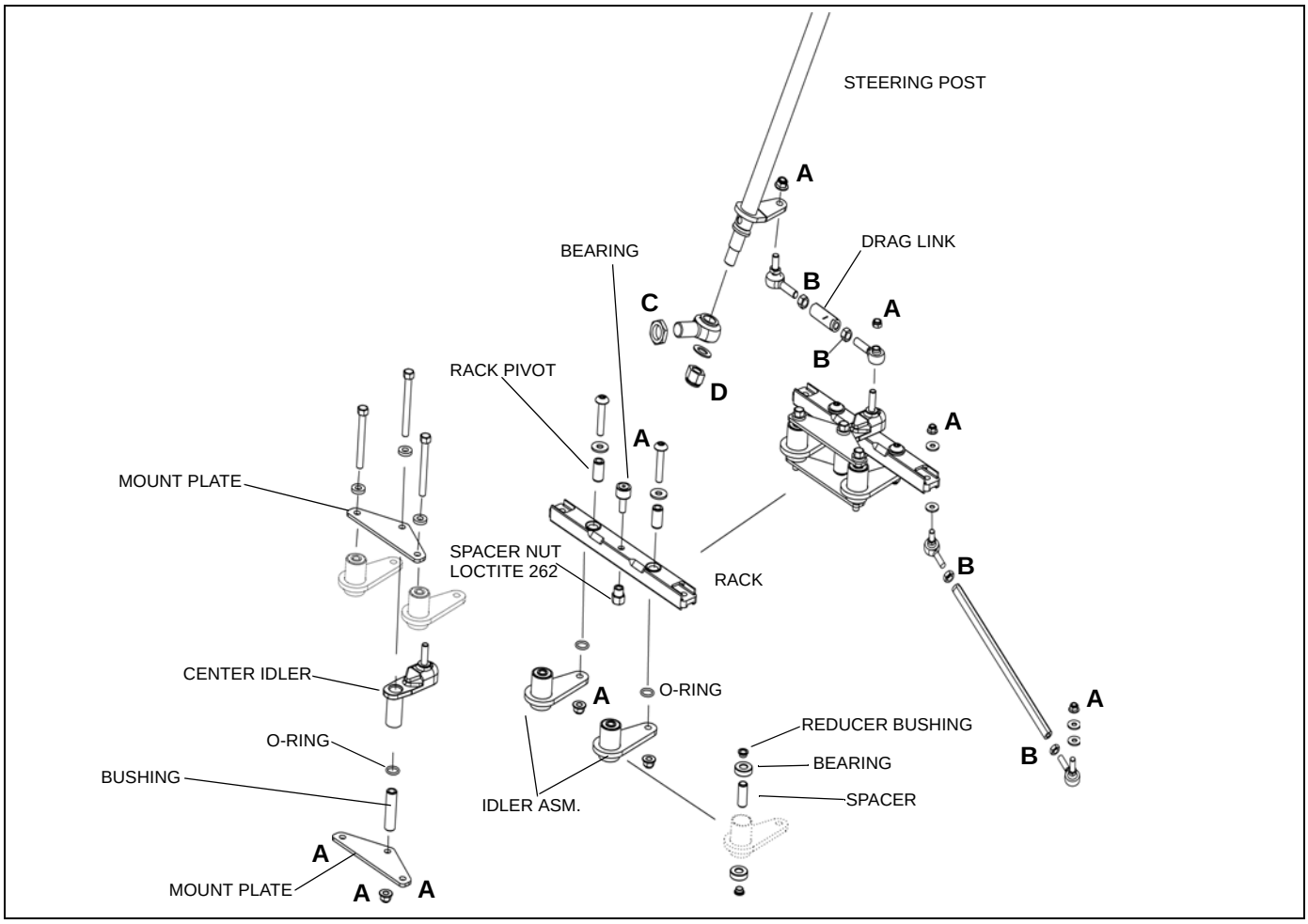
IQ Racer / 600 RR Steering Post



CAUTION
Never re-use lock nuts. Always re-assemble using new lock nuts.

= T
A = 16 Ft.Lbs. (22 Nm) B = 18 Ft.Lbs. (24 Nm)

2008 IQ Racer Steering Assembly



CAUTION
Never re-use lock nuts. Always re-assemble using new lock nuts.

= T
A = 28 Ft.Lbs. (38 Nm) B = 11 Ft.Lbs. (15 Nm) (Rod end jam nuts.) C = 35 Ft.Lbs. (47 Nm) (Apply Loctite 262 to threads.) D = 40 Ft.Lbs. (54 Nm)

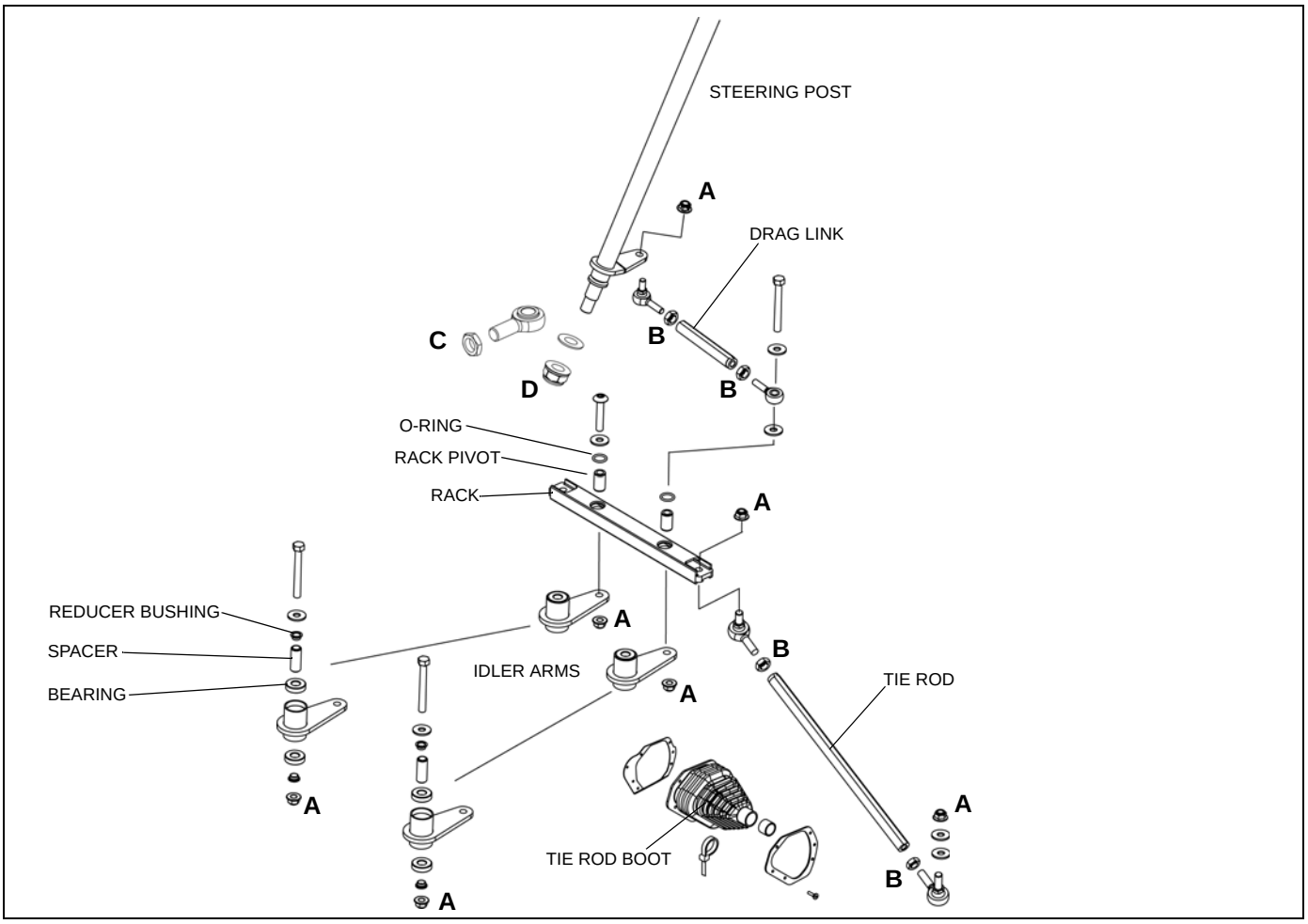
NOTE: Orientate rod ends so they are parallel with mating component.

Linkage Assembly Measurements

IQ Racer Tie Rod Length	16.52in. (419.6mm)
IQ Racer Steering Drag Link Length	4.18in. (106mm)

NOTE: Measurements are rod-end center-to-center with rod-ends perpendicular to tie rod.

2008 600 RR Steering Assembly



Linkage Assembly Measurements

600 RR Tie Rod Length	15.64in. (397.2mm)
600 RR Drag Link Length	6.93in. (176mm)

NOTE: Measurements are rod-end center-to-center with rod-ends perpendicular to tie rod.

CAUTION

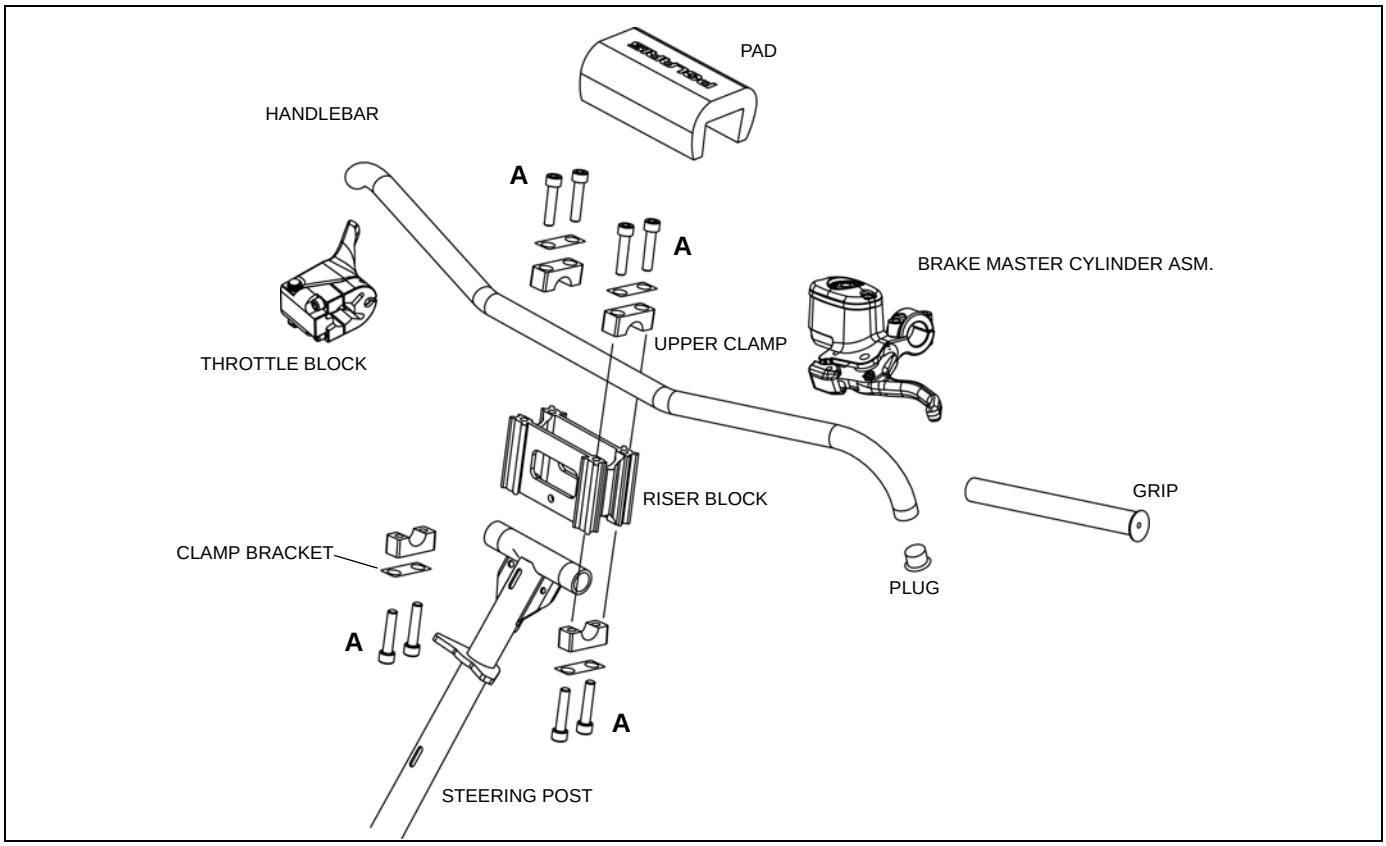
Never re-use lock nuts. Always re-assemble using new lock nuts.

= T

A = 28 Ft.Lbs. (38 Nm)
B = 11 Ft.Lbs. (15 Nm) (Rod end jam nuts.)
C = 35 Ft.Lbs. (47 Nm) (Apply Loctite 262 to threads.)
D = 40 Ft.Lbs. (54 Nm)

NOTE: Orientate rod ends so they are parallel with mating component.

Handlebar Assembly



= T
A = 15 - 17 Ft.Lbs. (20 - 23 Nm)

ADJUSTMENT PROCEDURES

SETUP AND ADJUSTMENTS

Spring preload is the amount of pressure at which the spring is held. The longer the installed length of the spring, the less the amount of preload; the shorter the installed length of the spring, the more the amount of preload. An increase in IFS shock spring preload will result in an increase in ski pressure.

To adjust front spring preload on threaded adjust models, grasp the spring and turn in a clockwise direction (as viewed from the top of the shock) to increase the preload. Turn in a counterclockwise direction to decrease preload.

Always set the preload equally between the right and left-side shocks.

For the best ride the spring preload should be as low as possible. Set the preload to use the full travel of the ski shock with occasional light bottoming.

> **⚠ CAUTION**
>
> If the plastic nut is unscrewed from the threaded body the nut will break. Always leave one thread showing above the plastic nut or the spring coils will stack, resulting in damage.

To determine if the suspension is using full travel, place the shock's jounce bumper against the shock body, then test ride the machine.

The bumper will move on the rod in relation to the amount of travel. For example, if the shock travel is full, the bumper will travel the entire length of the shock rod.

To prevent excessive bottoming-out, install the next highest rate spring, or reduce the preload on the existing spring and change the shock valving to obtain the desired effect.

NOTE: Shock valving can only be adjusted or changed on models that have serviceable shocks.

Alignment Bar Specifications

- DIAMETER: .623"-.625" (15.824-15.875mm)
- LENGTH: 45" (114.3cm)
- MATERIAL: C-1018

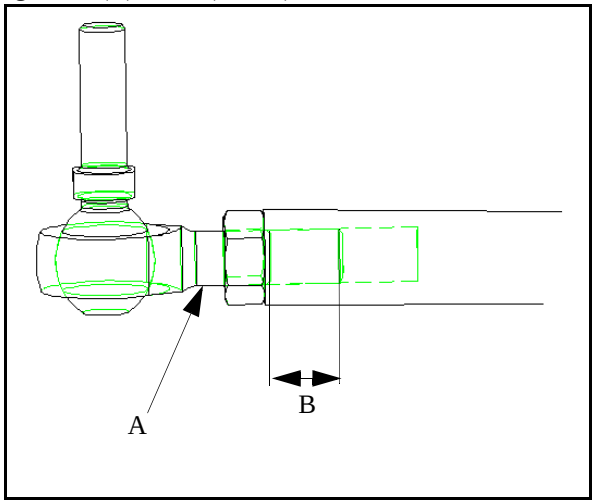
Rod Ends

Rod ends must be parallel to their respective mounting surface after tightening jam nut. If possible, support the edge of the rod end to keep it from rotating out of position until jam nut is tight. When rod ends are properly tightened, the rod should rotate freely approximately 1/8 turn.

Rod End Engagement

Rod ends must engage the rod a minimum of 2x the thread diameter when adjustment is complete.

Example: .4375" (11mm) rod end (A) X 2 = minimum thread engagement (B) .875" (22mm).



Handlebar Centering

1. Raise the front of the machine off the floor so that the spindles are off the floor 3”(7.62cm).
2. Insert the alignment bar through both ski bolt holes in each spindles.
3. Adjust Toe until handlebar is centered.

Toe Adjustment

Toe is adjusted with the shocks and skis installed. Track alignment must be correct before starting this process.

Toe alignment is measured at ride height.

1. Lift front of the machine off the floor rock the front end up and down and then set it down gently. This will set the unit at ride height.
2. Measure and make a mark 10” (2.54cm) forward of the ski mount bolt and 10” (2.54cm) behind the ski mount bolt, preferably on the center line of the carbide skags.
3. Place a straight edge along the one side of the track. Make sure that the straight edge is touching along the length of the track.
4. Record the measurements from the edge of the straight edge to the forward ski mark and the rearward ski mark.
5. Adjust the tie rod so that both measurements are the same.
6. Place the straight edge on the opposite side of the track and measure the opposite ski marks.
7. Adjust the tie rod so that both measurements are the same.
8. Verify that the ski center distances are within specification from the forward marks and the rearward marks.

DISASSEMBLY AND ASSEMBLY

Spindle Removal

1. Securely support the front of the machine up off the floor.
2. Remove the ski(s).
3. Remove the upper control arm (UCA)-to-spindle fastener.
4. Remove the fastener securing the lower control arm (LCA) to the spindle. Note the orientation of the fastener and nut.
5. Remove the tie rod from the spindle, by removing the nut and bolt.

Spindle Assembly

1. Assembly is the reverse order of disassembly. Reference the front suspension assembly illustration for fastener torque values.

Spherical Bearing Replacement

1. Remove the fastener securing the lower control arm (LCA) to the spindle.
2. Remove the lower shock fastener.
3. Remove the fasteners securing the LCA to the bulkhead.
4. Remove the snap ring, then, using a press, press the spherical bearing out of the LCA.
5. Press in a new bearing, then install the snap ring.
6. Assemble the LCA into the spindle, and shock into LCA. Reference front suspension assembly illustration for fastener torque values.

Upper / Lower Control Arm Removal

1. Remove the fastener securing the control arm being removed from the spindle. Remove the lower shock fastener.
2. Remove the fasteners securing the control arm to the bulkhead.
3. Remove the control arm, pivot bushings, and pivot shafts.

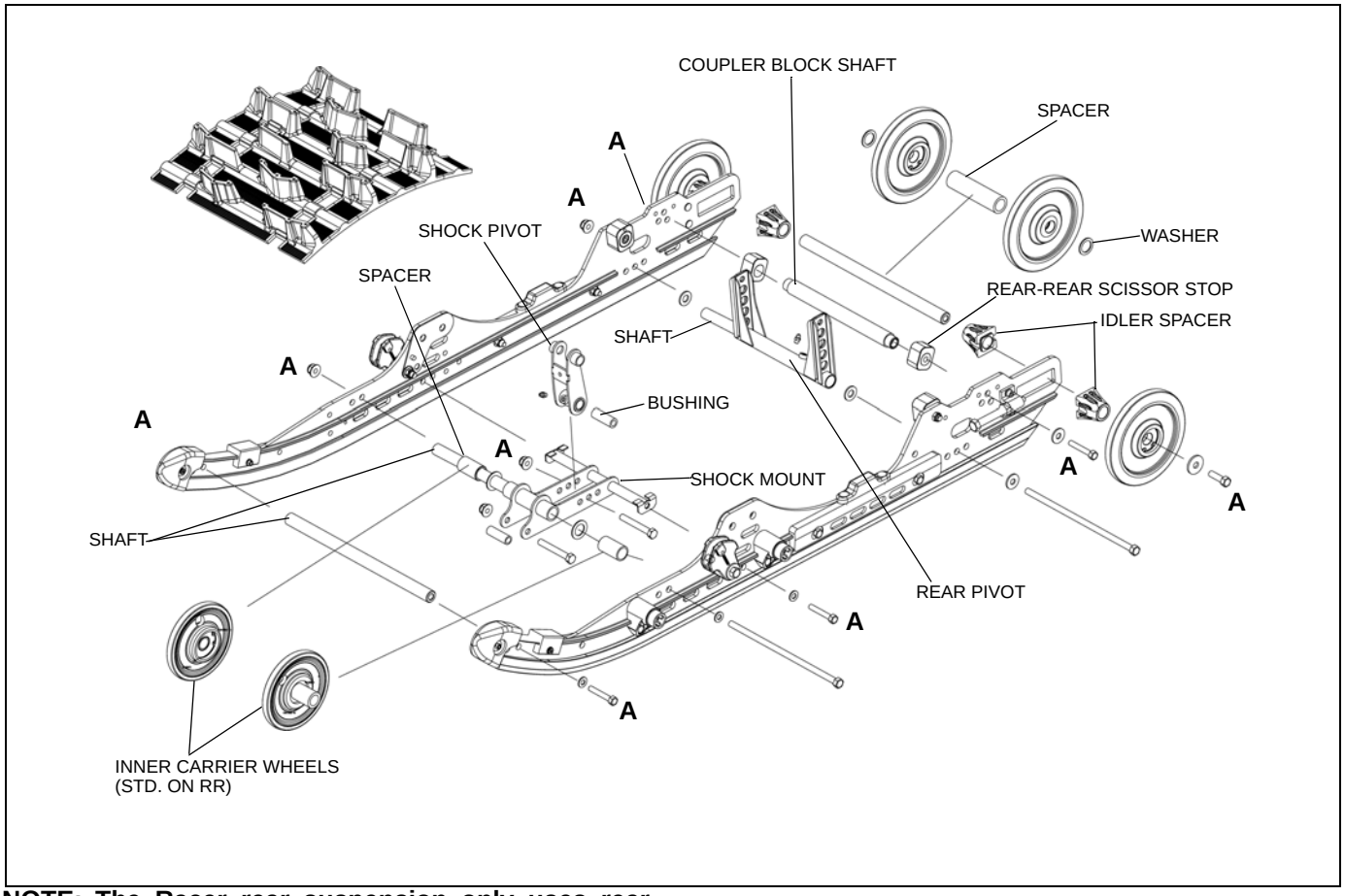
Upper / Lower Control Arm Installation

1. Replace the upper or lower control arm bushings in the control arm(s).
2. Replace the upper or lower control arm(s) into the bulkhead.
3. Reference the front suspension illustration for the appropriate fastener torque.

NOTE: There is a washer located on the rearward lower control arm mounting at the bolt head.

REAR SUSPENSION ASSEMBLY ILLUSTRATIONS

2008 Racer / RR Pivots and Rear Idler



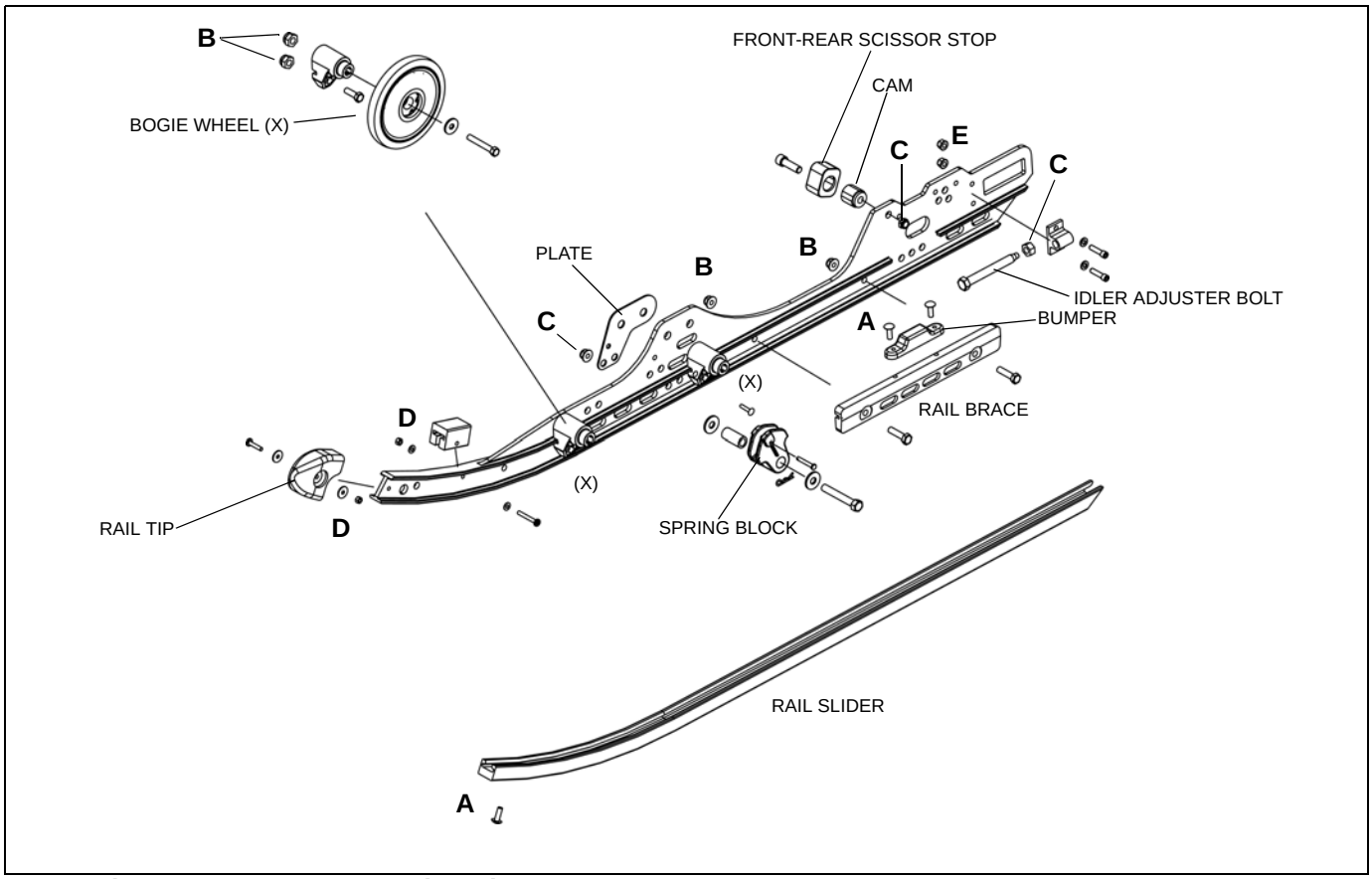
NOTE: The Racer rear suspension only uses rear idler wheels. The addition of inner carrier wheels is optional.

= T
A = 35 Ft.Lb. (47 Nm) Front Track Shock Fasteners = 35 Ft.Lbs. (47 Nm) Rear Track Shock Fasteners = 25 Ft.Lbs. (34 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

2008 Racer / RR Rail Assembly



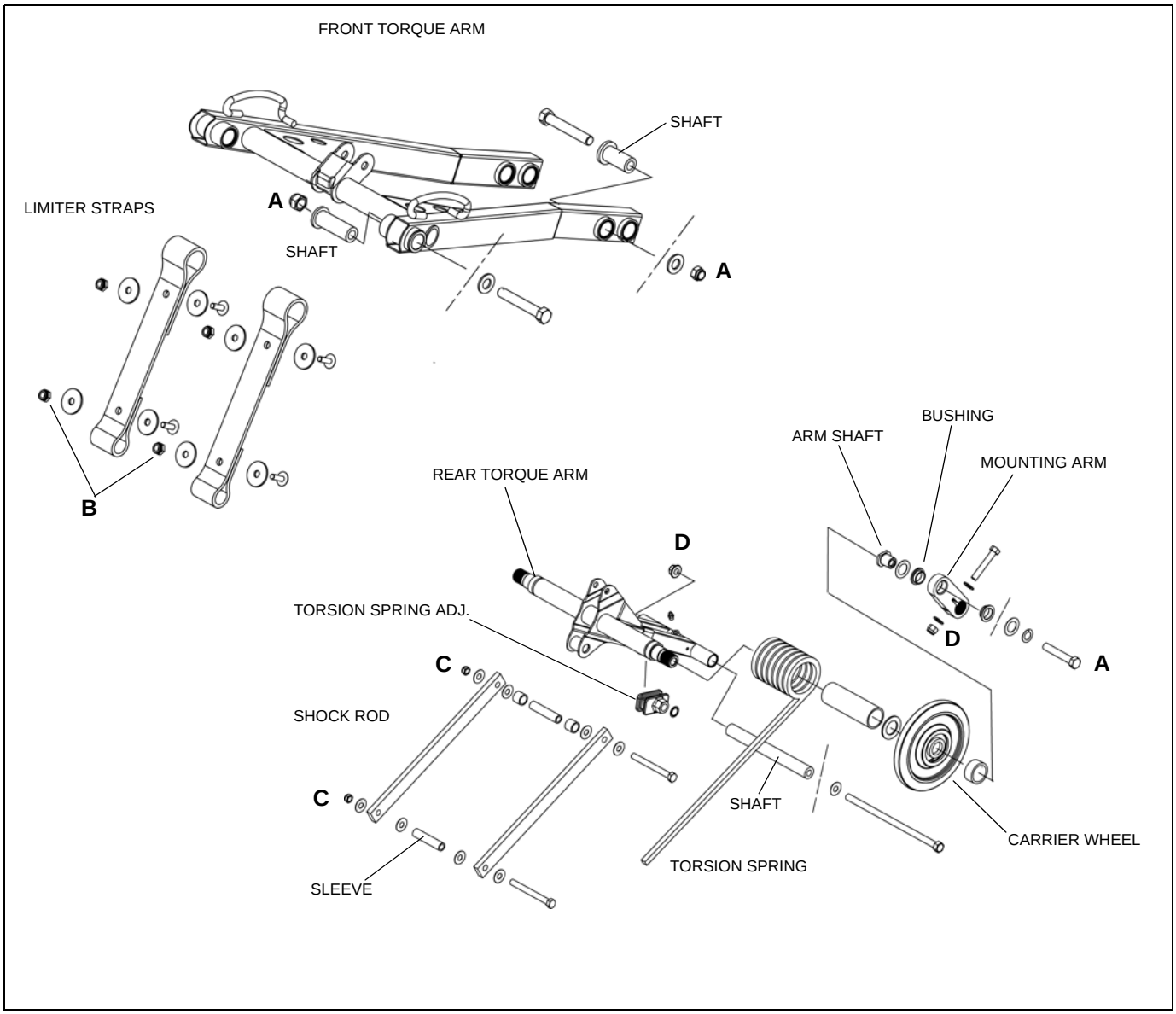
NOTE: The Racer rear suspension does not use bogie wheels. The addition of rail bogie wheels is optional.

= T
A = 3 - 6 Ft.Lb. (4 - 8 Nm) B = 19 Ft.Lb. (26 Nm) C = 35 Ft.Lb. (47 Nm) D = 35 In.Lb. (2 Nm) E = 7 Ft.Lbs. (9.5 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

2008 Racer / RR Front and Rear Torque Arms



= T
A = 45 - 55 Ft.Lbs. (61 - 75 Nm) B = 12 Ft.Lbs. (16 Nm) C = 25 Ft.Lb. (34 Nm) D = 35 Ft.Lb. (47 Nm) Front Track Shock Fasteners = 35 Ft.Lbs. (47 Nm) Rear Track Shock Fasteners = 25 Ft.Lbs. (34 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

⚠ CAUTION

The fasteners securing the rear suspension to the tunnel are pre-coated with a locking agent when new. Never re-use these fasteners when removed. Always use new pre-coated fasteners when mounting the suspension to the tunnel.

REAR SUSPENSION OPERATION

Operation

The primary function of the rear suspension is to provide a comfortable ride in all types of riding conditions. It separates the rider from the ground, while allowing for complete vehicle control. The rear suspension also must provide weight transfer and maintain track tension.

Rear suspensions have many adjustable features for fine tuning to achieve optimum comfort. The suspension can be adjusted to suit rider preference and deliver excellent performance for a given set of conditions. However, suspension adjustments always involve compromises. A rear suspension set up to perform well in moguls would not suit the preference of a groomed trail rider.

Weight Transfer

The shifting of weight from the skis to the track is called weight transfer. As engine torque is applied to the drive axle, the torque is transferred to the track, pulling it forward. This energy also tries to pull the suspension forward. The front torque arm reacts to this force by pushing down on the front of the track, in effect applying more weight to the front of the track and reducing the weight on the skis. It is important to note that energy used to lift the front of the machine is not available to push the vehicle forward.

Changing the angle of the front torque arm changes the suspension's reaction to the force. Adjusting the length of the limiter strap will change the front torque arm angle. Shortening the strap limits the extension of the front of the suspension; reducing the angle of the torque arm and increasing ski pressure during acceleration. Lengthening the strap allows the front of the suspension to extend further; increasing the angle of the torque arm and decreasing ski pressure during acceleration. Limiter strap adjustment has a great affect on weight transfer. Limiter straps only affect acceleration. It is important to check track tension whenever limiter strap length is changed.

Front track shock spring preload also affects weight transfer. A stiffer spring and/or more preload on the spring transfers more weight to the track. A softer spring and/or less preload keeps more weight on the skis. Keep your riding application in mind when choosing springs and setting spring preload. Soft springs/preload will increase ski pressure, but may bottom out. Stiff springs/preload will provide more track pressure (reduced ski pressure), but may result in a less comfortable ride

During acceleration, the rear of the suspension will compress and the IFS will extend, pivoting the machine about the front torque arm. Because of this pivoting effect, rear spring and spring preload also have some effect on weight transfer. Softer rear springs, or less preload, allow more weight transfer to the track and reduce ski pressure. Stiffer rear springs, or increased preload, allow less weight transfer to the track and increase ski pressure. The main function of the rear torque arm is to support the weight of the vehicle and rider, as well as to provide enough travel to absorb bumps and jumps.

Shock valving also has an effect on weight transfer. Refer to shock tuning information in this chapter. Scissor stops also affect weight transfer. See scissor stop information also in this chapter.

Coupling

On all Polaris snowmobile rear suspensions, there are two torque arms that control the movement of the rail beam. Prior to the advent of suspension coupling, these torque arms could move independently of each other. Rear suspension coupling links the movement of the front and rear torque arms to each other.

The front rear scissor stop (FRSS) couples the movement of the front torque arm with the rear torque arm and limits the amount of independence between the movement of the front torque arm and the rear torque arm.

When hitting a bump, the front torque arm starts to compress. The FRSS links that movement to the rear torque arm, causing it to compress and raise the rear suspension up as one, allowing the suspension to hit the bump only once and eliminating kickback. The factory setting are usually adequate for all riders in all conditions.

The rear-rear scissor stop (RRSS) couples the movement of the rear torque arm with the front torque arm and limits the amount of independent movement between the rear torque arm and the front torque arm.

Adjusting the RRSS to a lower setting allows more weight to transfer to the rear for more traction.

Adjusting the RRSS to a higher position will reduce weight transfer, improve chatter bump ride and improve cornering performance.

REAR SUSPENSION ADJUSTMENTS

Adjustment Procedures

NOTE: Break-in the suspension for at least 150 miles (240 km) before making adjustments.

All settings will vary from rider to rider, and are dependant on rider weight, vehicle speed, riding style, and trail conditions. Always start with the factory settings. Make individual adjustments to suit rider preference. The machine should be methodically tested under the same conditions after each adjustment (trail and snow conditions, vehicle speed, riding position, etc.) until a satisfactory ride is achieved. Adjustments should be made to one area at a time, in order to properly evaluate the change.

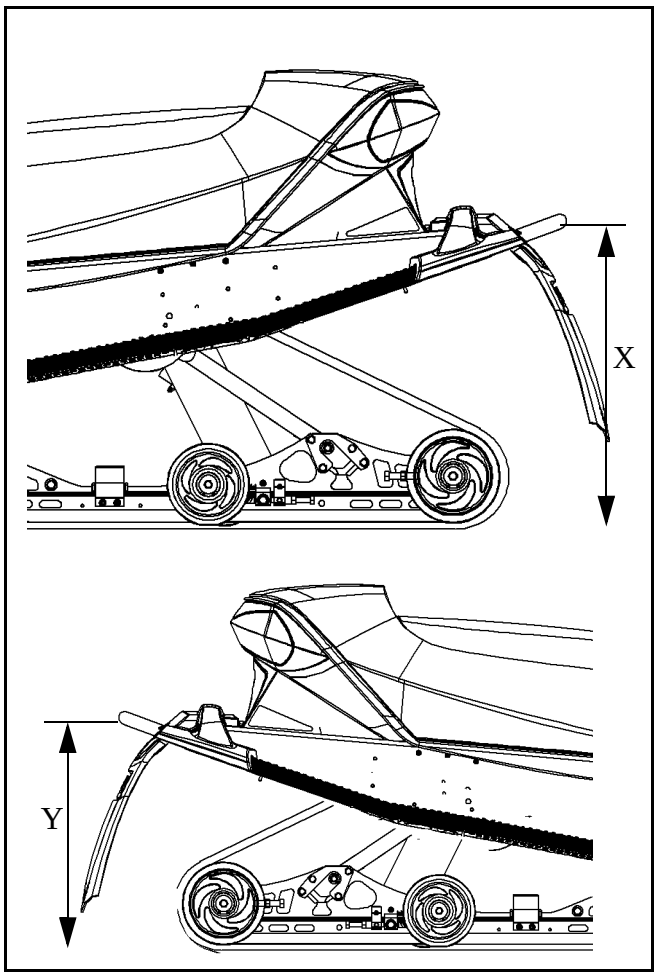
Rear Suspension Ride Height

1. To set up the rear suspension torsion spring preload, measure the distance between the ground and rear bumper with out the rider on the seat and the suspension at full extension. This can be achieved by lifting the rear of the machine so that the suspension is off the ground and carefully setting the machine down. Write this down as measurement “X”.
2. Have the rider in full gear drop down on the seat, work the suspension slightly by bouncing up and down and sit in the seated riding position. With the rider in the seated position measure from the ground to the bumper in the same spot as you did for measurement “X” and write it down as measurement “Y”.
3. To determine the correct ride height, subtract measurement X from measurement Y. (X - Y = ride height).
4. The ideal ride height is:

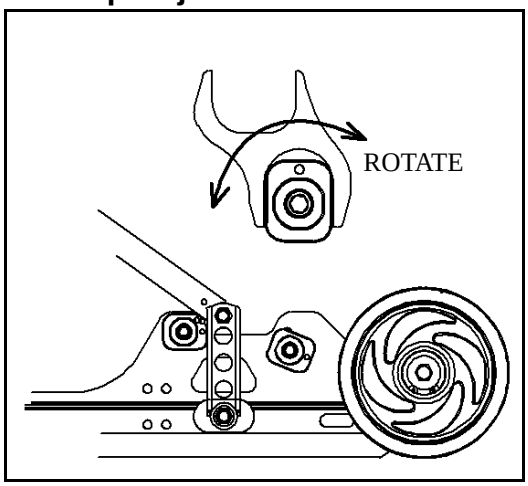
   - Racer / RR = 4-5”(10-13cm)

5. Adjust for the desired ride height by rotating the torsion spring cams located on the rear of the torsion spring.

If the rear suspension ride height cannot be adjusted to the correct dimension, optional torsion springs may be required. This is only an initial setup, and final spring preload may vary based on rider preference and riding conditions.



Scissor Stop Adjustment



The front rear scissor stop (FRSS) controls the bump attitude of the rear suspension. As the front torque arm (FTA) hits the bump, it forces the rear scissor to collapse a predetermined amount, depending on the FRSS block position.

This accomplishes two important things. First, it allows a lighter spring rate on the FTA because it can borrow spring rate from the

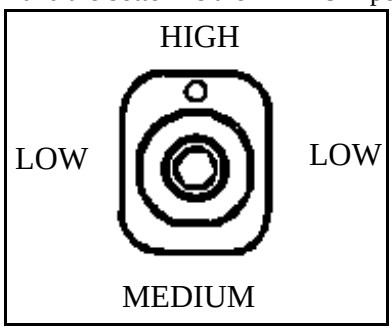
rear torsion springs. Second, it prepares the rear portion of the suspension for the bump, reducing secondary kick back.

The FRSS is made of a resilient material allowing smooth action and preventing any suspension component damage.

The RRSS controls weight transfer from the rear suspension to the skis. It also influences the stiffness of the ride by controlling the amount of coupling action between the front and rear torque arms. To decrease weight transfer, the RRSS should be set in the high position.

The RRSS can be removed for maximum weight transfer. However, unless the torsion springs and rear shock valving are changed, the ride will be compromised. Always maintain equal adjustment on both sides.

The dot is an indicator of the HIGH position. The sides are the LOW position and the bottom is the MEDIUM position.



Limiter Strap Adjustment

One method of changing ski-to-snow pressure is to change the length of the front limiter straps.

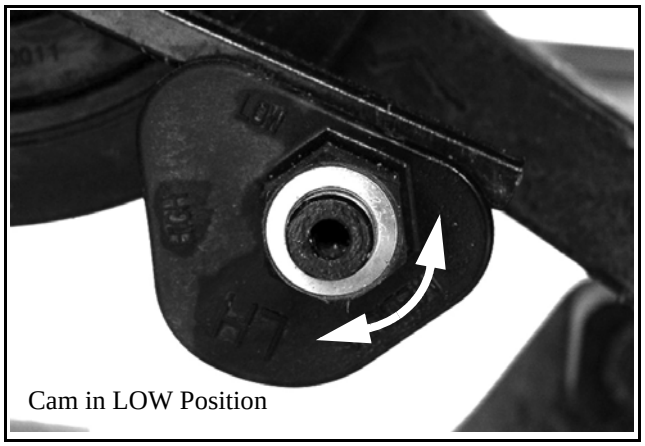
- Lengthening the straps decreases ski pressure under acceleration.
- Shortening the straps increases ski pressure under acceleration.

Set up Recommendations for Optimum Performance (RMK / Switchback Rear Suspensions)

- DEEP POWDER SNOW: Limiter strap in LOW position for maximum lift and flotation
- POWDER-HARDPACK: Limiter strap in STANDARD position for overall handling and speed over snow.
- HARDPACK: Limiter strap in HIGH position for increased control and less transfer.

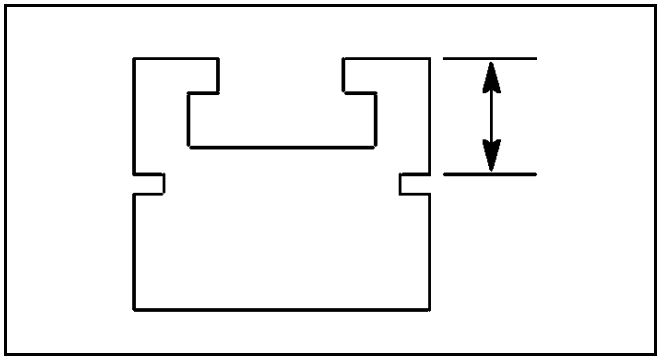
Torsion Spring Adjustment

To adjust the rear torsion spring, rotate the adjuster cam to the desired adjustment. The cam has three sides, LOW, MEDIUM and HIGH.


Cam in LOW Position

RAIL SLIDERS

Wear Limit



Replace sliders when wear exceeds notch. If sliders look “wavy” in appearance, check and adjust track tension or consider adding more bogie wheels.

Removal

1. Remove the rear suspension.

NOTE: Some models may allow the rail sliders to be removed by sliding it through track windows with the suspension mounted in the machine.

2. Remove front rail slider retaining bolt, located at the rail tip.
3. Use a block of wood or a drift punch and hammer to drive the slider rearward off the slide rail.
4. With the rail slider at room temperature, install a new rail slider by reversing steps 1 - 3.

NOTE: Lightly coat rail slider track clip area with a lubricant such as LPS2 or WD-40 to ease installation.

Break-In

After installing new rail sliders they must be “broke in” for longer life and better wear patterns. When performing the breaking in procedure ride the sled on a surface that has adequate snow conditions with deeper snow nearby. Run the sled on the adequate snow surface and dip into the deeper snow every so often.

REAR SUSPENSION REMOVAL AND INSTALLATION

Removal

1. Support the rear of the machine so that the track is off the floor.
2. Loosen the rear idler bolts, then push the rear idler shaft toward the front of the machine.
3. Carefully release the torsion spring pressure (if equipped).
4. Remove the support from the tunnel letting the suspension carry the weight of the machine.
5. Remove the fasteners securing the skid to the tunnel.
6. Place a protective mat on the floor and tip the unit over on the left side, supporting the sled on the end of the handlebar.
7. Collapse the torque arms, and remove the suspension from the tunnel.

Installation

> **⚠ CAUTION**
>
> Always use new fasteners when securing the torque arms to the tunnel.

1. With the unit on its left side, place the suspension in the tunnel.
2. Align the front and rear torque arms with the tunnel mounting holes. Loosely install two new fasteners.

NOTE: On IQ 121 and Switchback skids, verify the rear track shock pivot and brackets are rotated forward before attempting to collapse the rear torque arm.

3. Set the machine upright.
4. Install the remaining two new torque arm mounting fasteners.
5. Torque the rear suspension mounting bolts to specification.
6. Align the track guides/clips with the suspension rails.
7. Adjust the rear idler to achieve the correct amount of track sag.

NOTES

CHAPTER 9
Shocks

SPECIAL TOOLS 9.2
SHOCK REBUILDING TOOLS 9.2
SHOCK SHIM PART NUMBERS 9.3
WALKER EVANS SHOCK VALVE PART NUMBERS 9.3
WALKER EVANS SHOCK VALVE PART NUMBERS - 7/16Ð I.D. 9.4
VALVE SHIM ARRANGEMENT 9.5
PISTON ORIENTATION 9.5
SPECIFICATIONS 9.6
2008 600RR / 600 IQ RACER SHOCK SPECIFICATIONS 9.6
SHOCK VALVE SHIM STACK CONFIGURATIONS 9.7
SHOCK MAINTENANCE 9.8
SHOCK MAINTENANCE 9.8
WALKER EVANS AIR SHOCK DISASSEMBLY 9.9
WALKER EVANS AIR SHOCK ASSEMBLY 9.9
WALKER EVANS REMOTE RESERVOIR / PIGGY BACK SHOCK DISASSEMBLY . . 9.10
WALKER EVANS REMOTE RESERVOIR / PIGGY BACK SHOCK ASSEMBLY 9.11

9

SPECIAL TOOLS

Shock Rebuilding Tools

Special Tools

PART NUMBER	DESCRIPTION
2200421	Gas Shock Recharging Kit
2201639	Shock Shaft Seal Protector .50" Diameter
2201640	Shock Shaft Seal Protector .625" Diameter
2870623	Shock Absorber Spring Compression Tool
2870803	Shock Spring Pre-Load Adjustment Tool
PS-45259	Gas Fill Tool
9917736	VIDEO-Rebuilding Mono Tube Shocks
9917737	VIDEO-Rebuilding Remote Reservoir Shocks

Ryde FX Shock Special Tools

PART NUMBER	DESCRIPTION
PS-45259	Gas Fill Tool and Gauge (Incl. 5 needles)
PS-45259-1	Gas Fill Needles replacement pack
PS-45259-2	Gas Fill Gauge (replacement)
PS-45260	Lower Retainer Wrench
PS-45261	IFP Positioning / Extraction tool
PS-45262	Cylinder Head Wrench
PS-45263	Wear Band Tool
PS-45629	Arvin Shock Body Holder
PS-45280	Shock Collar Tool
PS-45821	Shock Reservoir Holder

FOX Shock Special Tools

PART NUMBER	DESCRIPTION
2871021	Shock Body Holding Tool
2871352	Shock Rod Holding Tool .50" Diameter Rod
2872429	Shock Rod Holding Tool .625" Diameter Rod
2871232	Fox Shock Spanner
2871351	Fox Shock IFP Depth Tool
PS-44925	Fox Inner Tube Puller PS 2

SHOCK SHIM PART NUMBERS

Shock shim stacks can be adjusted to control the amount of fluid that is forced by as the piston travels through its motion. Refer to the appropriate parts manual for a complete listing of shock parts.

Walker Evans Shock Valve Part Numbers

PART NUMBER	SIZE	THICKNESS
1800051	.700	.006
1800075	.800	
1800076	.900	
1800077	1.000	
1800078	1.100	
1800079	1.200	
1800080	1.300	
1800081	.700	.008
1800082	.800	
1800083	.900	
1800084	1.000	
1800085	1.100	
1800086	1.200	
1800087	1.250	
1800088	1.300	
1800052	.700	.010
1800053	.800	
1800054	.900	
1800055	1.000	
1800056	1.100	
1800057	1.200	
1800058	1.300	
1800059	.700	.012
1800060	.800	
1800061	.900	
1800062	1.000	
1800063	1.100	
1800064	1.200	
1800089	1.250	
1800072	1.300	
1800066	.700	.015
1800067	.800	
1800068	.900	
1800069	1.000	
1800070	1.100	
1800071	1.250	
1800072	1.300	
1800090	1.000	.025
1800091	1.100	
1800092	1.200	
1800093	1.300	
1800050	.625	.065
1800204	.875	.090

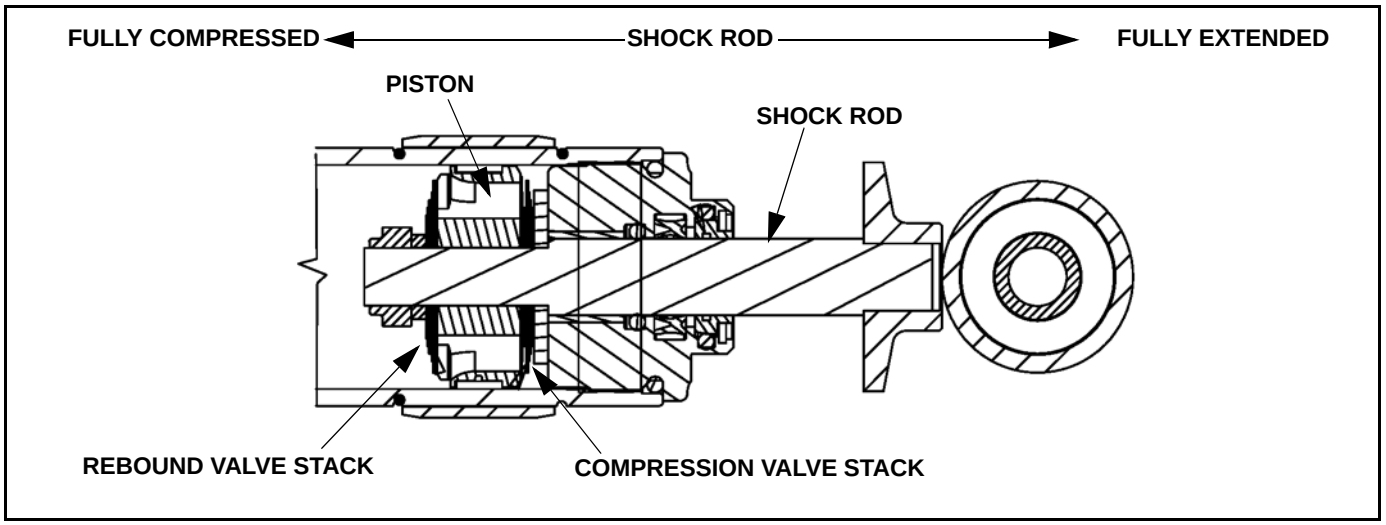
Walker Evans Shock Valve Part Numbers - 7/16″ I.D.

PART NUMBER	SIZE	THICKNESS
1800244	.900	.010
1800245	1.000	
1800246	1.100	
1800247	1.200	
1800248	1.300	
1800249	1.450	
1800250	1.500	
1800251	1.550	
1800252	.900	.012
1800253	1.000	
1800254	1.100	
1800255	1.200	
1800256	1.300	
1800257	1.450	
1800258	1.500	
1800259	1.550	
1800260	.900	.015
1800261	1.000	
1800262	1.100	
1800263	1.200	
1800264	1.300	
1800265	1.450	
1800266	1.500	
1800267	1.550	
1800268	1.000	.090 (WASHERS)
1800269	1.100	
1800270	1.250	
1800271	1.300	.025

Valve Shim Arrangement

Shown below is an example of how valving stacks are arranged.

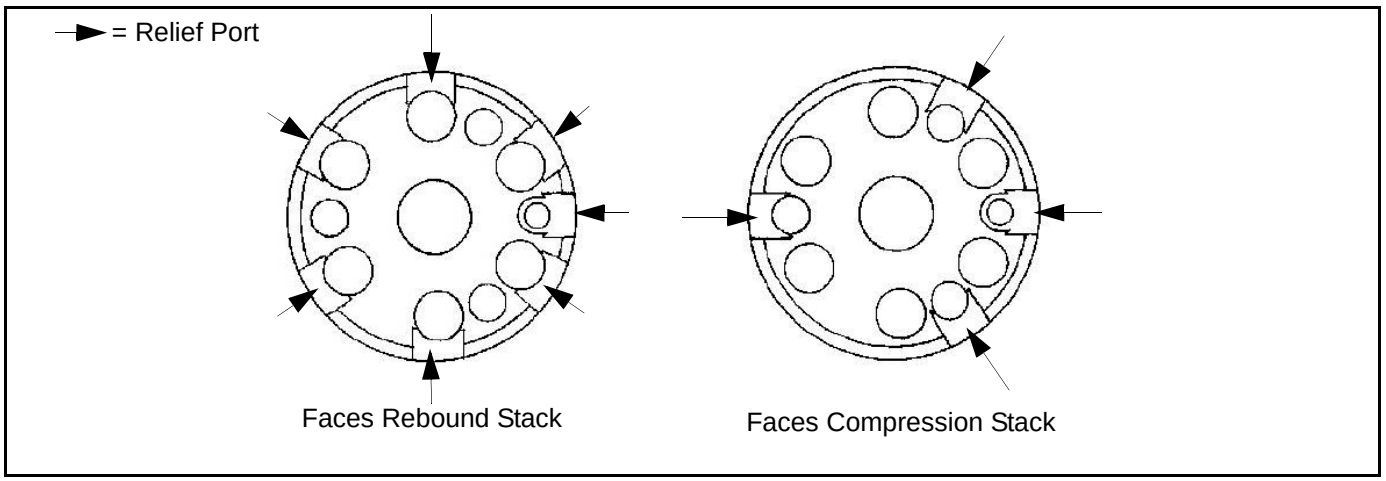
NOTE: The rebound and compression valve stacks will always be positioned as shown in the illustration, regardless of how the shock assembly is installed on the snowmobile.



Piston Orientation

The face of the piston with the greater number of relief ports will always face the rebound valve stack.

NOTE: On some Walker Evans shocks, piston is color-coded.
Blue = COMPRESSION SIDE
Red = REBOUND SIDE.



9

SPECIFICATIONS

2008 600RR / 600 IQ Racer Shock Specifications

IFS Shock

SHOCK PN	MODEL	EXTENDED LENGTH IN (MM)	COLLAPSED LENGTH IN (MM)	STROKE IN (MM)	SHOCK ROD IN (MM)	IFP DEPTH IN (MM)	OIL VOLUME	PSI (BAR)
7043345	600RR	18.343 (465.9)	11.384 (289.2)	7.00 (177.8)	.625 (15.9)	2.25 (57.15)	Full	200 (13.8)
7043360	600 IQ Racer							

FTS Shock

SHOCK PN	MODEL	EXTENDED LENGTH IN (MM)	COLLAPSED LENGTH IN (MM)	STROKE IN (MM)	SHOCK ROD IN (MM)	IFP DEPTH IN (MM)	OIL VOLUME	PSI (BAR)
7043312	600RR 600 IQ Racer	12.58 (319.5)	8.51 (216.2)	4.07 (103.4)	1.124 (28.5)	N/A	50cc	170 (11.7)

RTS Shock

SHOCK PN	MODEL	EXTENDED LENGTH IN (MM)	COLLAPSED LENGTH IN (MM)	STROKE IN (MM)	SHOCK ROD IN (MM)	IFP DEPTH IN (MM)	OIL VOLUME	PSI (BAR)
7043354	600RR	15.00 (381)	9.65 (245.1)	5.35 (135.9)	.625 (15.9)	2.5 (63.5)	Full	200 (13.8)
7043311	600 IQ Racer							

Shock Valve Shim Stack Configurations

NOTE: All measurements are in inches.

SHOCK PN	7043345	7043360	7043312	7043354	7043311
REBOUND	.625 x .065 .700 x .010 .800 x .010 .900 x .010 1.00 x .010 .800 x .010 1.10 x .008 .800 x .010 1.20 x .010	.630 x .063 1.000 x .012 1.100 x .012 1.100 x .012 1.100 x .012 1.100 x .015 1.200 x .012 1.200 x .012 1.250 x .015 1.250 x .015 1.250 x .015 .700 x .010 .700 x .010	.625 x .065 .700 x .015 .800 x .015 .900 x .015 1.00 x .015 1.10 x .015 1.20 x .015 1.25 x .015	1.00 x .090 .900 x .010 1.000 x .010 1.100 x .010 1.200 x .012 1.300 x .012 1.450 x .012 1.000 x .012 1.500 x .010	.765 x .063 .900 x .015 1.000 x .015 1.100 x .015 1.100 x .015 1.200 x .015 1.300 x .015 1.450 x .015 .900 x .015 .900 x .012
Piston Orifice	.052	.042	N/A	.052	.042
COMPRESSION	1.30 x .006 .800 x .010 1.25 x .008 .800 x .012 1.10 x .010 1.00 x .008 .900 x .008 1.25 x .012 1.10 x .010 1.00 x .010 .900 x .012 .800 x .010 .875 x .090	.700 x .010 .700 x .010 1.300 x .015 1.250 x .015 .800 x .012 1.100 x .015 1.000 x .015 .900 x .015 .800 x .015 .700 x .015 1.100 x .012 .900 x .012 .800 x .012 1.200 x .125	1.30 x .015 1.25 x .015 1.20 x .015 1.10 x .015 1.00 x .015 .900 x .015 .800 x .015 .700 x .015 .700 x .015 .700 x .015 1.30 x .125	1.550 x .010 1.500 x .010 1.000 x .012 1.550 x .012 1.500 x .012 1.450 x .012 1.300 x .010 1.200 x .010 1.100 x .010 .900 x .010 1.250 x .090	.900 x .010 .900 x .010 1.450 x .015 1.450 x .015 1.450 x .010 .900 x .010 1.450 x .010 1.450 x .010 1.100 x .010 1.000 x .015 .900 x .015 .900 x .015 1.500 x .100
ADJUSTER	1.10 x .025 1.00 x .025 .625 x .065	1.10 x .025 1.00 x .025 .625 x .065	N/A	1.10 x .025 1.00 x .025 1.00 x .025 .700 x .010 .625 x .065	1.10 x .025 1.00 x .025 1.00 x .025 .700 x .010 .625 x .065

NOTE: Valve shim stacks listed as they would appear on the shaft when shock rod is locked in a table vise (eyelet down, threaded end up).

SHOCK MAINTENANCE

⚠ WARNING

WHEN USING COMPRESSED AIR TO DRY COMPONENTS, PROTECTIVE EYE WEAR SHOULD BE WORN TO AVOID RISK OF INJURY.

Nitrogen gas is under extreme pressure. use caution when releasing nitrogen gas from shock. Protective eye wear should be worn to avoid risk of injury.

⚠ CAUTION

Extreme caution should be observed while handling and working with high pressure service equipment. Wear a face shield, safety glasses, and ear protection during service of these shocks. Care should be observed while handling the inflater needle and pressure gauges. Maintain your equipment and keep it in good working condition. If injury should occur, consult a physician immediately.

Extreme cleanliness is of utmost importance during all disassembly and reassembly operations to prevent any dirt or foreign particles from getting into the shocks. Keep the parts in order as they are disassembled. Note the direction and position of all internal parts for reassembly.

Before servicing a gas shock it is important that all the gas pressure be discharged from the unit. Refer to the instructions listed below for the proper procedure of discharging the gas pressure from a shock. Protective eye wear should be worn to avoid risk of injury while servicing Ryde FX gas charged mono-tube shocks.

When removing the spring from a shock that utilizes a fixed lower retainer; the use of a proper spring compressor should be used to avoid risk of bodily injury.

It is important that the gas shock be retained in the vise by the lower mount. Any other method of securing the chock body during these procedures may deform the shock body cylinder.

Point air valve away from face and body when charging or discharging any shock.

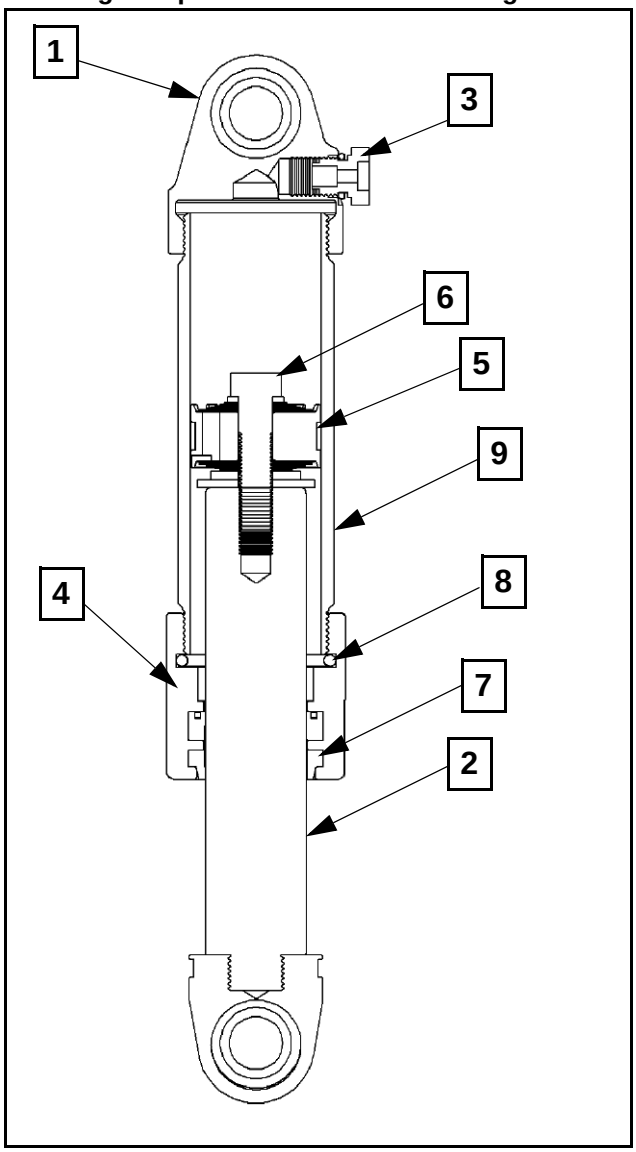
Shock Maintenance

Changing oil on Shocks is recommended annually and should be included when performing end of season storage preparation. This oil change is necessary to avoid any chance of corrosion which could be caused by moisture contamination.

When performing maintenance use Gas Shock Recharging Kit, PN 2200421. The kit consists of the necessary valves, pressure gauge, and fittings to deflate and pressurize the shocks. The Body Holder Tool, Internal Floating Piston (IFP), and Shock Rod Holding Tool are not included in the Recharging Kit and must be ordered separately. Refer to your SPX Specialty Tool catalog for part numbers.Videos on shock rebuilding are also available. Monotube shocks 9917736, Remote Reservoir 9917737.

Walker Evans Air Shock Disassembly

IMPORTANT: Verify the protective outer boot is not torn or damaged. If damaged, inspect the shock shaft for damage. Replace shock shaft if damage is found.



1. Place the body cap (1) of the shock in the vise so that the shock rod (2) is facing downward.
2. Remove the service port screw (3) and release the pressure with the shock charging needle. Verify all pressure is released.
3. Place the body cap (1) in the vise, so that the shock rod (2) is facing upward.
4. Slowly loosen the shock rod bearing cap (4) and remove from the shock.
5. Empty all the shock oil from the shock body and discard the old oil.
6. Inspect the valve stack (5) as needed. Replace any worn, wavy, bent valve shims.
7. If valve shim service or adjustment is done, torque the piston retaining bolt (6) to 25-30 ft-lb (34-41 N-m).

= T
Piston retaining bolt: 25-30 ft-lb (34-41 N-m)

8. If required, replace the bearing cap seal (7) and o-ring (8).

Walker Evans Air Shock Assembly

1. Place the specified amount of fluid into the shock body.

CAUTION
Do not overfill the shock oil level. Too much shock oil may cause the shock rod to hydro lock.

2. Insert and torque down the bearing cap (4) assembly into the shock body (9).

= T
Bearing Cap Torque: 85 ft-lb (115 N-m)

CAUTION
Do not over-torque the shock rod bearing cap or shock performance will be compromised.

3. Flip shock over in the vise so that the shock rod is facing downward.
4. Pressurize the shock to 170 psi (11.7 bar). Hold the fill tool needle in the port for thirty seconds to allow the nitrogen gas to stabilize.

IMPORTANT: Never re-insert the fill tool needle back into the shock to check pressure after initial charging. The amount of gas required to fill the tool will give a false pressure reading.

Always completely discharge the shock and refill to obtain an accurate pressure reading.

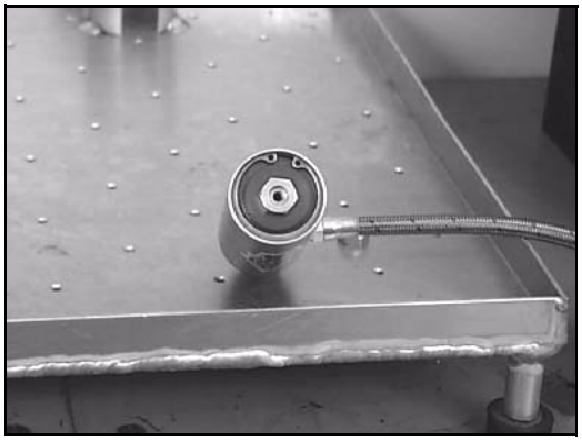
5. Check for any leaks.
6. Reinstall the protective boot and carefully reinstall shock.

Walker Evans Remote Reservoir / Piggy Back Shock Disassembly

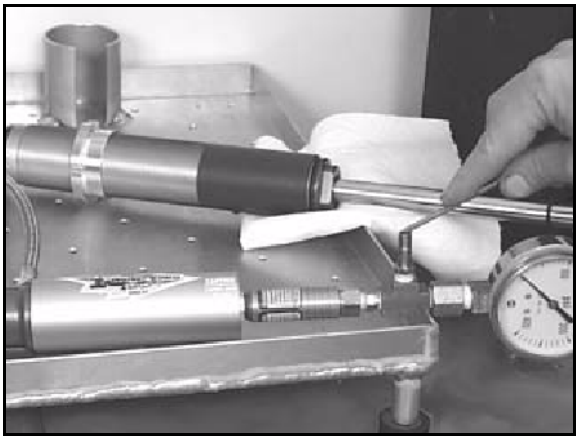
NOTE: Remote reservoir shock show.

IMPORTANT: To prevent damage or marks to the shock, the use of soft jaws on a vise is recommended.

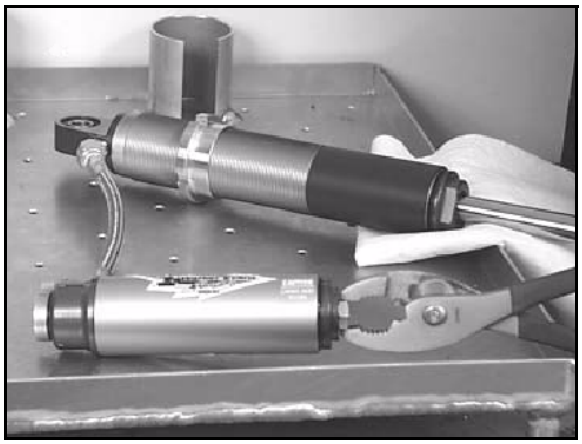
1. Clean and carefully remove shock from the suspension.
2. Remove button head screw (1) from reservoir cap (if applicable).



3. Insert safety needle carefully and depressurize the shock.

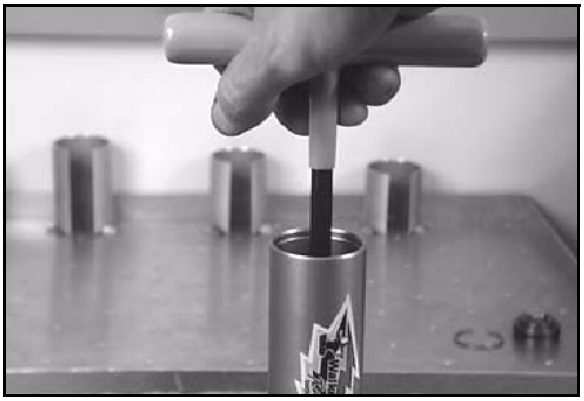


4. Press the end cap into the reservoir to access the snap ring.
5. Remove the snap ring, then remove the cap from the body.



6. Place the shock lower eyelet in a vise.
7. Loosen and remove the bearing cap from the shock.
8. Remove the used oil from the shock body.

NOTE: Insert the IFP tool (PN PS-45908) and cycle the internal floating piston (IFP) a few times to purge the shock oil from the reservoir.



9. Remove the IFP from the reservoir with the IFP tool (PN PS-45908).
10. Clean and inspect ALL parts and replace worn out parts if needed.

IMPORTANT: Seal kits are available and should be installed at this time if seals or o-rings are damaged or worn.

11. Place the shock rod in a vise so that the threaded part is facing upward.
12. Place the valve stack on a clean shop towel in order of removal.

NOTE: Place the valve stack on a clean shop towel in case you have to move them. This will also help when assembling them back onto the shock rod.

13. Inspect the valves for kinks, waves, pits or foreign material.
14. Inspect the piston wear band and replace if damaged or worn.

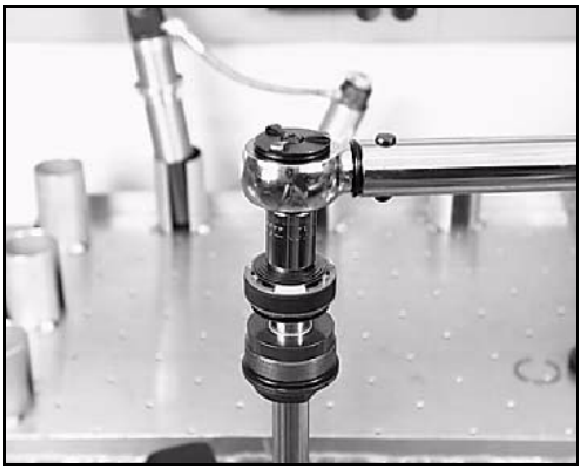
Walker Evans Remote Reservoir / Piggy Back Shock Assembly

1. Secure the shock rod in a vise with the threads of the rod facing up.
2. Place the compression valve stack on the rod in the reverse order of disassembly.
3. Place the valve piston on top of the compression stack.

4. Place a new lock nut onto the shock rod. Torque the new lock nut to specification.

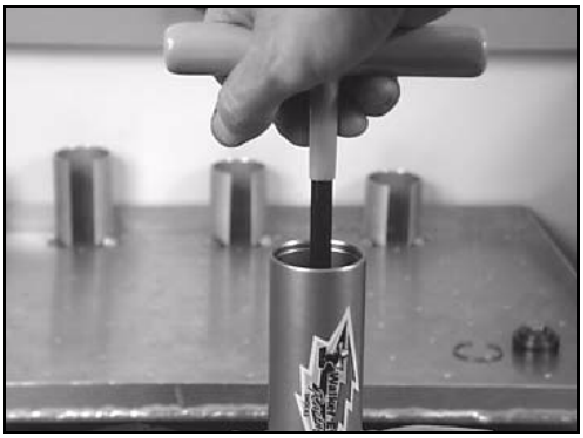
= T
Lock Nut Torque: 14 ft-lb (19N-m)

IMPORTANT: Do not over torque or damage to the valve stack can occur.

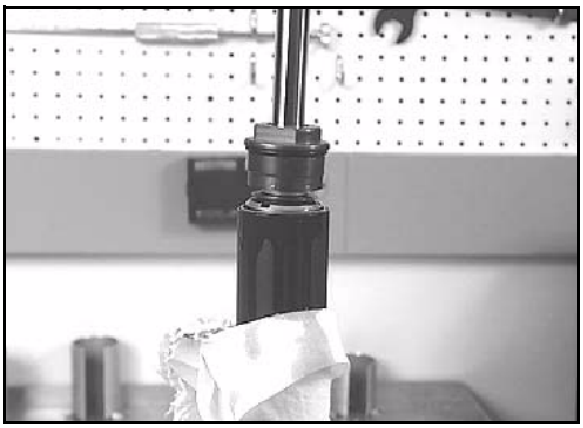


5. Secure the shock body by its lower mount.
6. Set the compression damping adjustment selector to position “1”.
7. Fill the shock body and remote reservoir 1/2 full of Walker Evans 5w shock oil (PN 2874522).
8. Apply a thin film of oil to the IFP o-ring and floating wear band located on the shock rod piston.
9. Compress the wear band and insert the IFP into the reservoir. Allow as much air as possible to escape as you install the piston.

10. Screw the IFP tool, PN PS-45908, into the IFP.
11. Hold or place the reservoir as low as possible so the air will travel upward as you slowly cycle the IFP up and down.
    - Be sure to bottom out the piston in the reservoir body.
    - Allow time for the bubbles to dissipate.
    - Repeat the process until all the air has been removed.
12. Set the IFP so it is approximately 1/8 from the bottom of the reservoir. Install the bleed screw.



13. With the cylinder head assembly pushed down against the valve piston, dip the piston assembly in shock oil.



14. Fill the shock body with oil to the bottom of the threads. Carefully insert the piston rod and valve assembly into the cylinder.
    - Slightly oscillate the piston rod to allow the piston to enter the shock body bore as it purges the air out
    - Slight up and down movement may be required to allow all the air to pass through the piston assembly.
15. Slowly push the piston rod and assembly into the shock body until the threads can be engaged.

NOTE: During installation, some shock oil will over flow. Wrap a shop cloths around the shock body to catch any oil overflow.

IMPORTANT: Fast installation of the piston rod and assembly may displace the internal floating piston (IFP) from its original position. Performance issues will be a result if the IFP is not in its specified position.

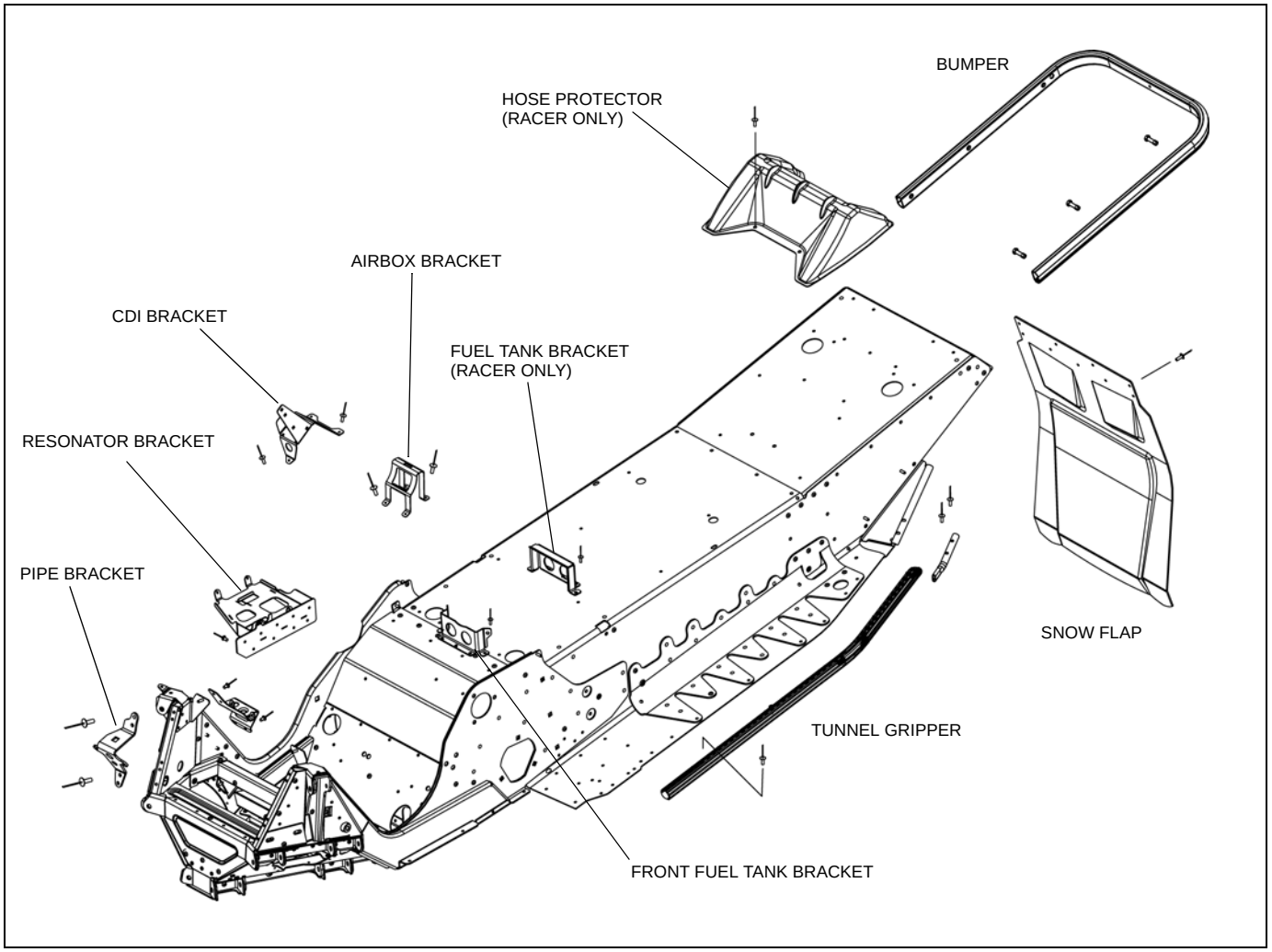
16. Tighten the cylinder head onto the shock body.
17. Verify the IFP is set at the specified depth. If not, verify there is oil on top of the IFP, then open the bleed screw.
18. Set the IFP to specification, then close the bleed screw.
19. Pour out any remaining shock oil from the reservoir.
20. Install the cap making sure the o-ring does not flip-over. Install the snap ring.
21. Charge the shock to the specified pressure.
22. Clean the shock of all oil reside and check for any leaks.
23. Install button screw onto the reservoir cap.

CHAPTER 10
Chassis

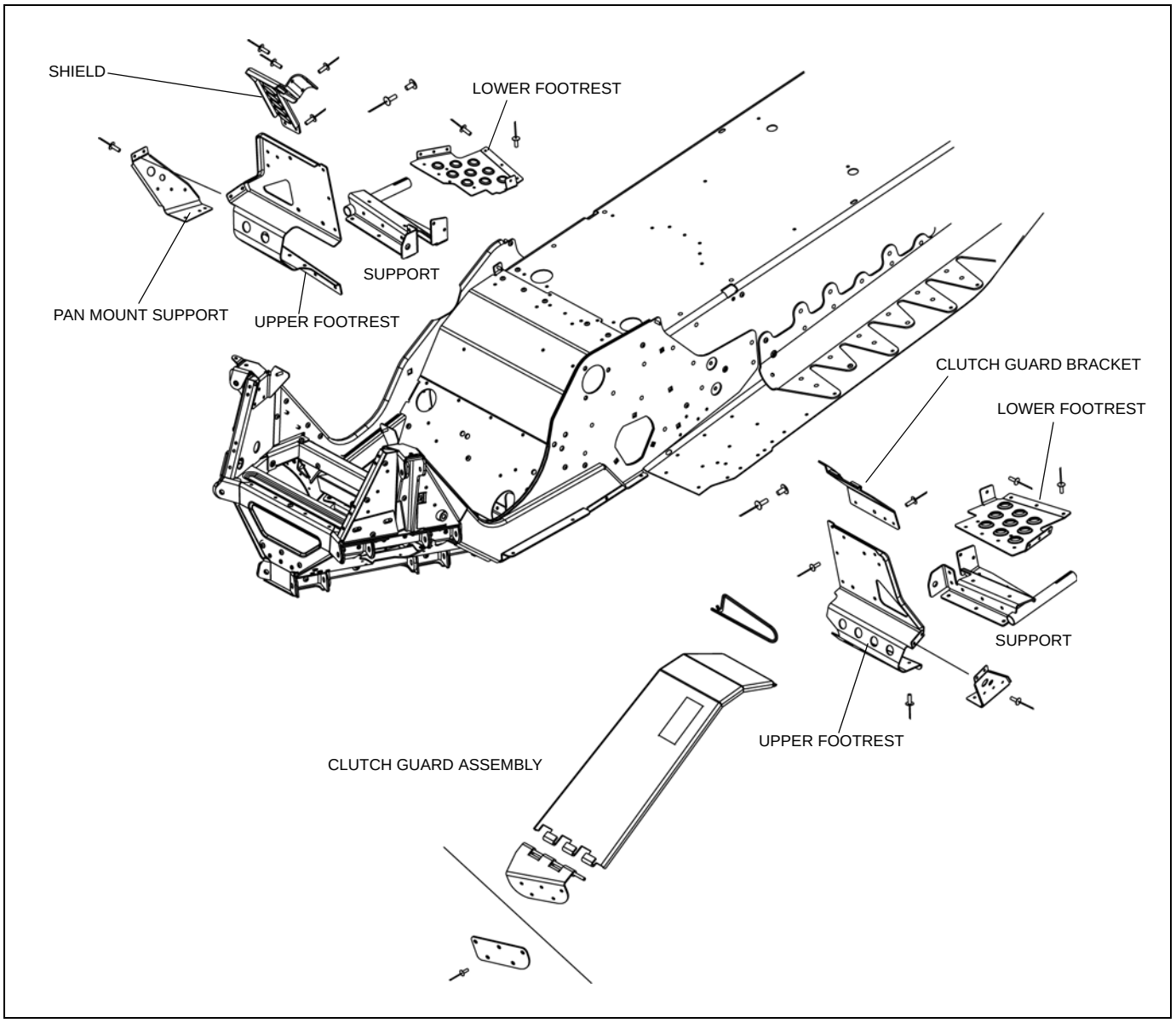
CHASSIS 10.2
BULKHEAD AND TUNNEL 10.2
FOOTREST STRUCTURE 10.3
CONSOLE AND SEAT 10.4
CONSOLE ASSEMBLY VIEW 10.4
SEAT 10.4
HOOD 10.5
HOOD ASSEMBLY VIEW 10.5
HOOD MOUNTING AND BUMPER 10.6
NOSEPAN AND SIDE PANELS 10.7
ASSEMBLY VIEW 10.7

CHASSIS

Bulkhead and Tunnel

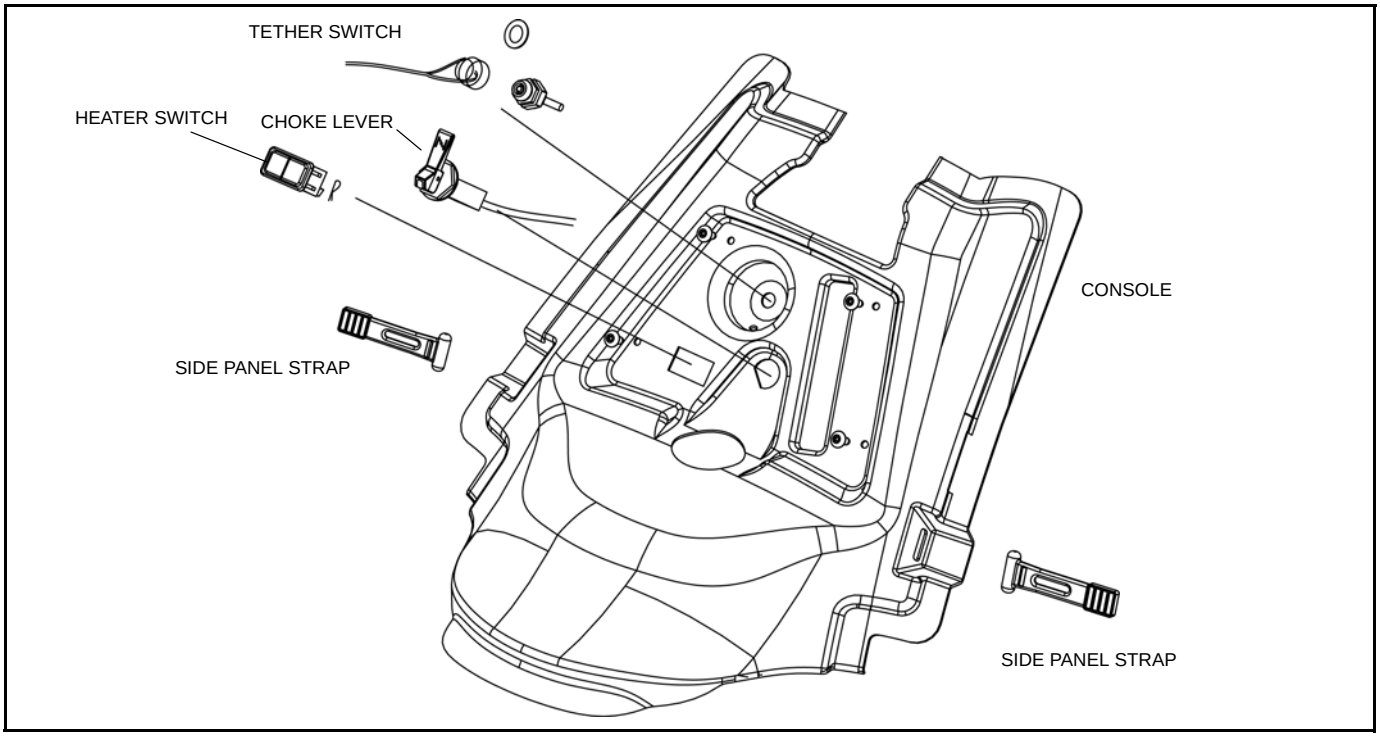


Footrest Structure

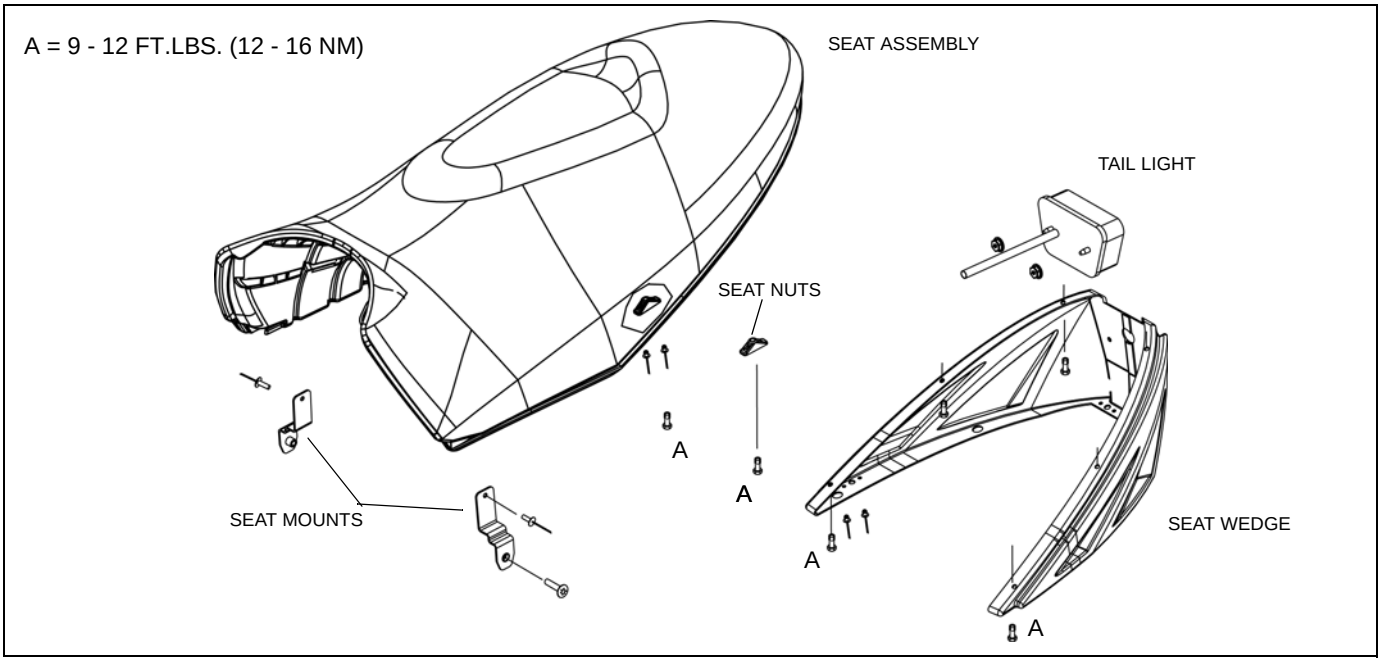


CONSOLE AND SEAT

Console Assembly View

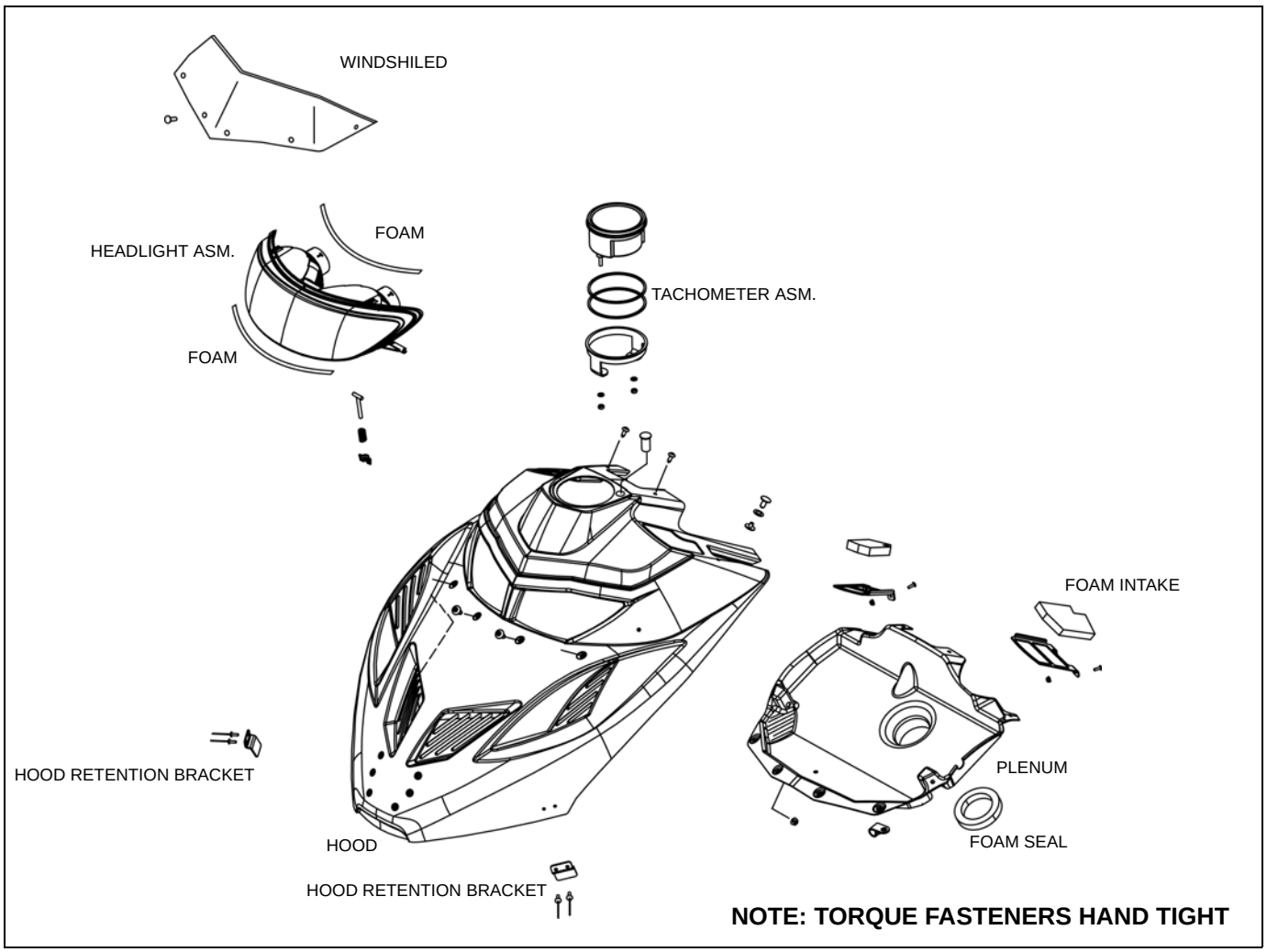


Seat

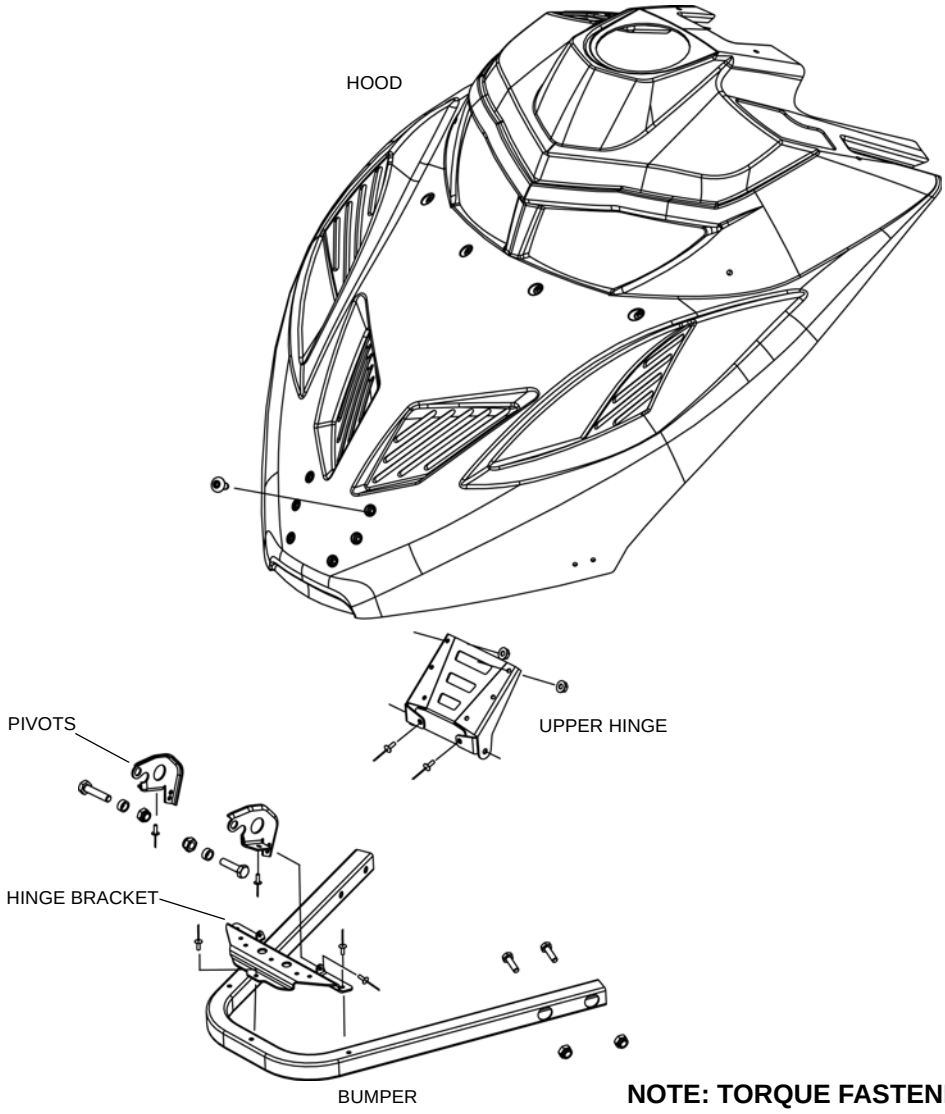


HOOD

Hood Assembly View



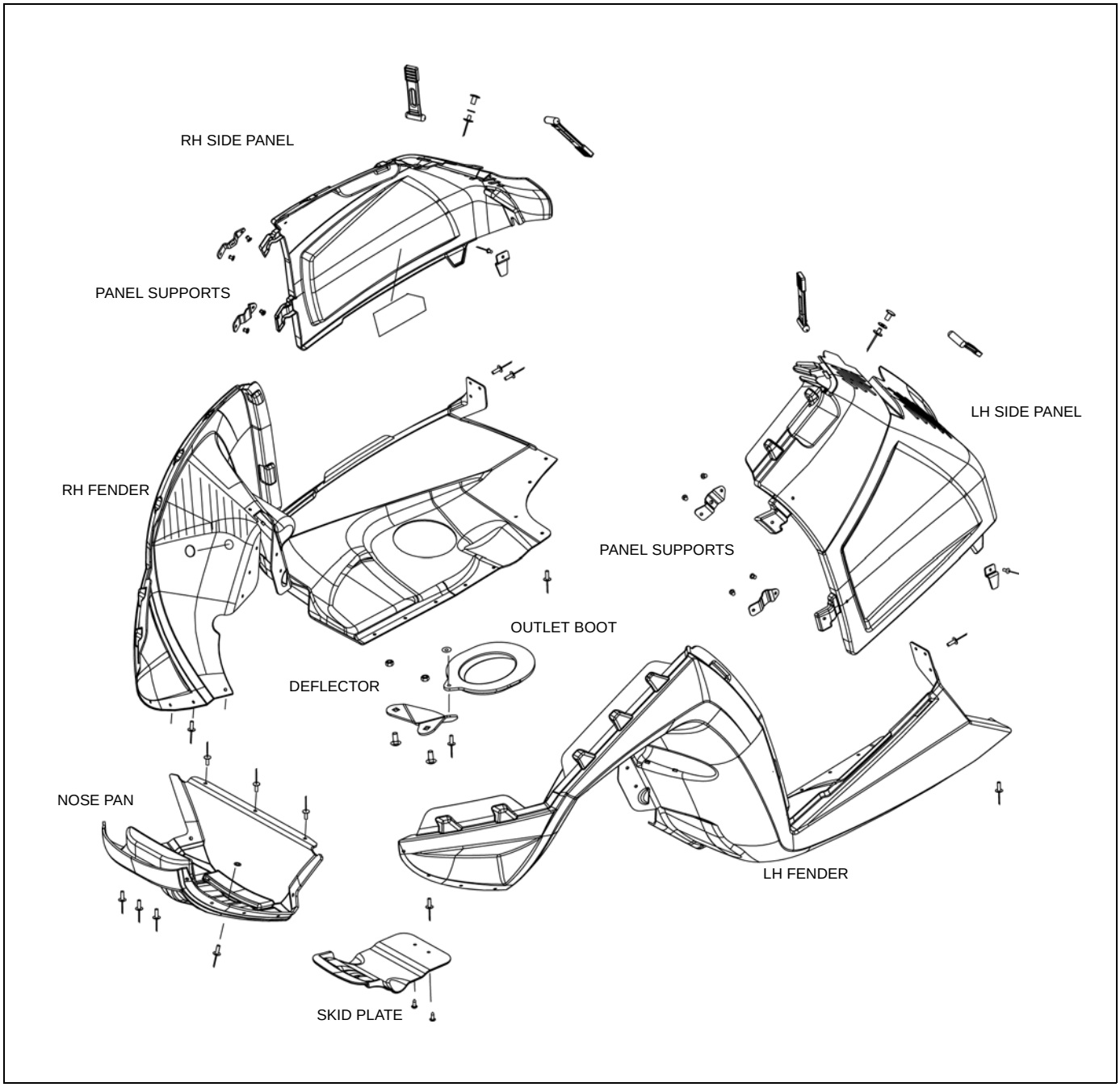
Hood Mounting and Bumper



NOTE: TORQUE FASTENERS HAND TIGHT

NOSEPAN AND SIDE PANELS

Assembly View



NOTES

CHAPTER 11
ELECTRICAL SYSTEMS

ELECTRICAL SPECIFICATIONS 11.2
SPARK PLUG 11.2
IQ RACER STATOR SPECIFICATIONS 11.2
IQ RACER COMPONENT MARKINGS 11.2
600 RR STATOR SPECIFICATIONS 11.2
600 RR COMPONENT MARKINGS 11.2
IGNITION COIL PACKS 11.2
EXHAUST VALVE SOLENOID 11.3
COOLANT TEMPERATURE SENSOR 11.3
KNOCK SENSOR 11.3
IGNITION/CHASSIS REGULATORS 11.3
EXHAUST TEMPERATURE PROBE 11.3
IGNITION TIMING 11.4
TIMING PROCEDURE - CARBURETED ENGINES 11.4
IGNITION TIMING CHART 11.4
IQ RACER IGNITION TIMING CURVE 11.5
IQ RACER IGNITION TIMING CURVE SELECTOR 11.5
IQ RACER HOT LAMP ACTIVATION TEMPERATURE 11.5
600 RR HOT LAMP ACTIVATION TEMPERATURE 11.5
600 RR HOT CONDITION RPM LIMIT 11.5
DRAGON FIRE PIPE HEATER SYSTEM 11.6
SOLENOID-CONTROLLED EXHAUST VALVES 11.6
THROTTLE POSITION SENSOR (TPS) 11.6
TPS TEST TOOL SETUP 11.6
USING THE TPS TEST TOOL 11.7
TPS ADJUSTMENT - CARBURETED MODELS 11.7
SWITCHES 11.8
BRAKE LIGHT 11.8
HEAD LIGHTS 11.8
HANDWARMER / THUMBWARMER SWITCH 11.8
DRAGON FIRE SWITCH 11.8
AUXILIARY ON/OFF SWITCH 11.8
TETHER SWITCH 11.8
KEY SWITCH (600 RR ONLY) 11.8
OIL LEVEL SWITCH (600 RR ONLY) 11.8
REVERSE SWITCH (600 RR ONLY) 11.8
2008 600 RR REGULATOR / RECTIFIER 11.9
DETONATION CONTROL (DET) 11.9
2008 600 RR OVERVIEW 11.9
VARIABLE EXHAUST SYSTEM (VES) 11.9
OVERVIEW 11.9
ELECTRONIC REVERSE (PERC) 11.10
OPERATION 11.10
FORWARD OPERATION 11.10
ALTITUDE SETTING 11.10
IMPORTANT NOTES 11.10
TROUBLESHOOTING TABLES 11.11
NO IGNITION (SPARK) 11.11
INCORRECT TIMING 11.11

11

ELECTRICAL SPECIFICATIONS

Spark Plug

Type Stock Optional	 Champion RN57YCC NGK BPR9ES
Gap	.027″ / 0.70mm

IQ Racer Stator Specifications

NOTE: Use a multimeter to test the stator circuits. Remember to test the circuits when the engine is cold and after the engine has been running for some time.

Resistance Values

BLUE TO GREEN	0.65Ω
WHITE TO WHITE/RED	185Ω
YELLOW TO BROWN	.10Ω
BLACK TO BROWN	0Ω
BROWN TO BASE	0Ω

Output Specifications

Vac Coil (Yellow / Brown)	10A @ 3000 RPM 17A @ 6000 RPM
Vdc Ignition Coil (Blue / Green)	5.3A @ 3000 RPM

IQ Racer Component Markings

Component	Marking / Part Number*
Flywheel	14° / XF9201 / 4011869
Stator (Magneto)	XS9201 / 4011870
CDI	CB7253 / 4011970
DC Regulator	4011475
AC Regulator	4010793

* Parts numbers are subject to change at anytime.

600 RR Stator Specifications

NOTE: Use a multimeter to test the stator circuits. Remember to test the circuits when the engine is cold and after the engine has been running for some time.

Resistance Values

WHITE TO WHITE/RED	185Ω
YELLOW TO BROWN	.10Ω
RED TO BLACK/RED	30Ω
BLACK TO BROWN	0Ω
BROWN TO BASE	0Ω

Output Specifications

Vac Coil (Yellow / Brown)	18.8A @ 4000 RPM

600 RR Component Markings

Component	Marking / Part Number*
Flywheel	18° / XF9117 / 4010677
Stator (Magneto)	XS9127 / 4012132
CDI	CB7258 / 4012111
AC / DC Rectifier - Regulator	4011809

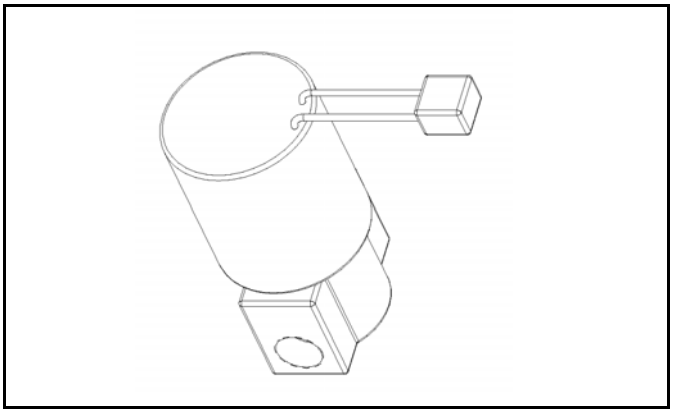
* Parts numbers are subject to change at anytime.

Ignition Coil Packs

Resistance Values

BLK TO WHT (Primary)	0.3Ω
BLK or WHT TO SECONDARY LEAD	OPENΩ
SECONDARY LEAD TO LEAD	5KΩ
PLUG CAPS	10KΩ

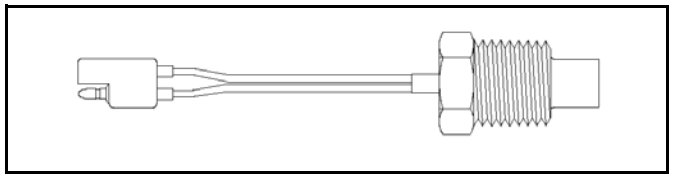
Exhaust Valve Solenoid



Resistance Values

Coil Resistance (WHT/YEL to RED)	15Ω +/- 15% @ 68°F (20°C)

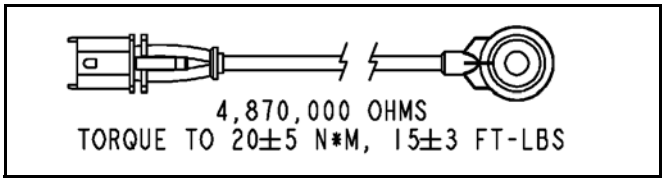
Coolant Temperature Sensor



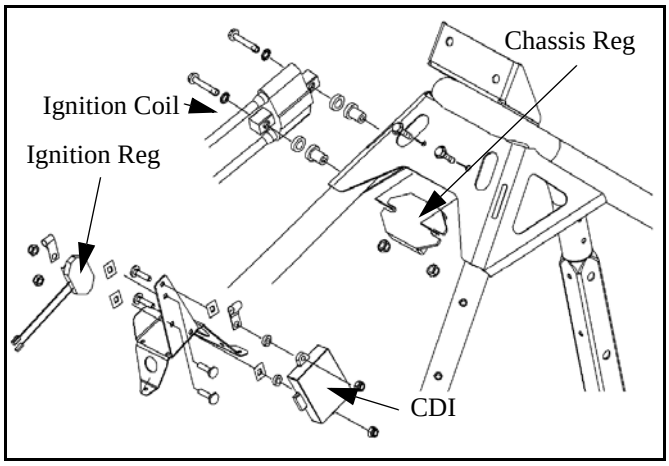
Sensor Specifications

Temperature (F / C)	Resistance (OHMS)
-22°F / -30°C	22914 - 28006Ω
32°F / 0°C	5085 - 6215Ω
68°F / 20°C	2189 - 2675Ω
149°F / 6°C	455 - 556.2Ω
221°F / 105°C	152.8 - 186.8Ω

Knock Sensor



Ignition/Chassis Regulators



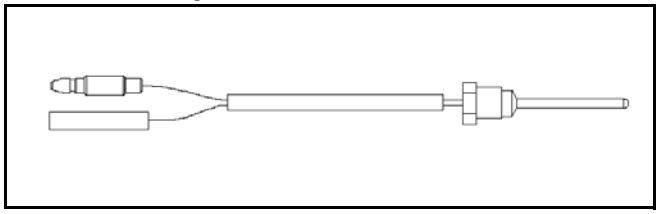
IQ Racer Ignition Regulator / Rectifier Specifications

WIRE COLOR	FUNCTION
YELLOW/RED	Stator Vac Input
YELLOW/RED	
RED	CDI 14.5Vdc Output
BROWN	Ground

IQ Racer Chassis Regulator Specifications

WIRE COLOR	FUNCTION
YELLOW	14.3Vac Head Lamp / Chassis Circuit
BROWN	Ground

Exhaust Temperature Probe



Resistance Values

Resistance between both leads.	6 - 12MΩ@ 68°F (20°C) Reading will rise after connecting to multimeter.

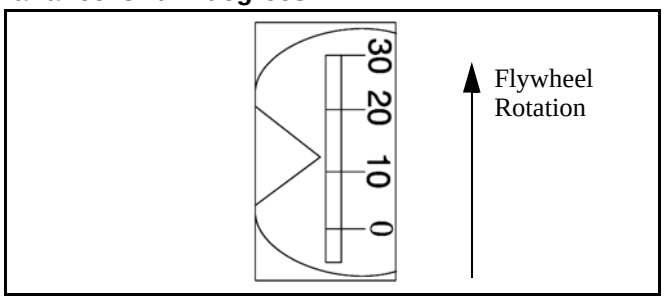
IGNITION TIMING / COMPONENTS

Timing Procedure - Carbureted Engines

NOTE: Always verify timing of engine at room temperature (68°F / 20°C), and at the specified RPM. If equipped, turn the timing curve selector knob to "D".

1. Reference the ignition timing chart.
2. Install a dial indicator gauge into the MAG spark plug hole.
3. Place the MAG piston in the proper timing position, then mark the flywheel at this point.

NOTE: Each 10 degree mark is separated by lines every 2 degrees (not shown). Acceptable timing variance is +/- 2 degrees.



4. Connect an accurate tachometer and a good quality timing light to the engine according to manufacturer's instructions.
5. If equipped, turn the timing curve selector knob to "D".
6. Start engine and increase RPM to the point specified in the timing specifications. Hold the throttle to maintain specified timing RPM.
7. Point the timing light at the timing inspection hole.
8. With your head positioned so there is a straight line between your eye, the stationary pointer and the crankshaft center line, note the relative position between the marked flywheel line and the pointer. If the stationary pointer is aligned with the mark made in Step 3, or within the acceptable variance, ignition timing is correct.
9. If the pointer is outside the variance, the stator will have to be rotated either with crankshaft rotation (to retard the timing) or against rotation to advance it.

NOTE: Rotate stator plate approximately the same distance as the marks must move. In most cases, the recoil starter housing, recoil drive hub, and flywheel must be removed to loosen the stator bolts and change the timing. On some engines, the stator plate retaining screws can be accessed through the flywheel.

10. Torque stator plate screws and flywheel nut to specified torque. Apply Loctite 262 (red) to crankshaft flywheel taper if required. Refer to the Specifications section for torque specifications and flywheel installation procedure for engine type.

Ignition Timing Chart

NOTE: If a timing curve selector box is installed, turn the selector knob to "D".

	600 HO CARBURETED		IQ 600 RACER ENGINE	
ROD/ STROKE (mm)	128mm ROD 64mm STROKE		132mm ROD 70mm STROKE	
Degrees BTDC	MM	Inches	MM	Inches
1	0.0061	0.0002	0.0067	0.0003
2	0.0244	0.0010	0.0270	0.0011
3	0.0548	0.0022	0.0607	0.0024
4	0.0974	0.0038	0.1078	0.0042
5	0.1522	0.0060	0.1684	0.0066
6	0.2190	0.0086	0.2424	0.0095
7	0.2979	0.0117	0.3298	0.0130
8	0.3889	0.0153	0.4305	0.0169
9	0.4919	0.0194	0.5445	0.0214
10	0.6068	0.0239	0.6717	0.0264
11	0.7336	0.0289	0.8121	0.0320
12	0.8723	0.0343	0.9656	0.0380
13	1.0227	0.0403	1.1321	0.0446
14	1.1849	0.0466	1.3115	0.0516
15	1.3586	0.0535	1.5038	0.0592
16	1.5439	0.0608	1.7089	0.0673
17	1.7406	0.0685	1.9266	0.0758
18	1.9487	0.0767	2.1569	0.0849
19	2.1681	0.0854	2.3996	0.0945
20	2.3986	0.0944	2.6547	0.1045
21	2.6402	0.1039	2.9220	0.1150
22	2.8927	0.1139	3.2013	0.1260
23	3.1560	0.1243	3.4927	0.1375
24	3.4300	0.1350	3.7958	0.1494
25	3.7146	0.1462	4.1106	0.1618
26	4.0096	0.1579	4.4369	0.1747
27	4.3149	0.1699	4.7746	0.1880
28	4.6303	0.1823	5.1235	0.2017
29	4.9558	0.1951	5.4835	0.2159
30	5.2911	0.2083	5.8543	0.2305
31	5.6361	0.2219	6.2358	0.2455
32	5.9907	0.2359	6.6278	0.2609
33	6.3546	0.2502	7.0302	0.2768
34	6.7278	0.2649	7.4427	0.2930
35	7.1099	0.2799	7.8652	0.3097
36	7.5010	0.2953	8.2974	0.3267
37	7.9007	0.3111	8.7392	0.3441
38	8.3089	0.3271	9.1903	0.3618
39	8.7254	0.3435	9.6506	0.3799
40	9.1501	0.3602	10.1198	0.3984

WINNING PERFORMANCE
POLARIS

IQ Racer Ignition Timing Curve Selector

The optional ignition timing curve selector box, PN 4010329, allows the operator to advance or retard the entire ignition timing curve by moving the selector knob to one of seven positions.

Dial Position	Timing (+ or -)	Resistance (Yellow to Black)
A	+3	465Ω - 485Ω
B	+2	606Ω - 632Ω
C	+1	0.98Ω - 1.02Ω
D	0 - No Change	1.44KΩ - 1.50KΩ
E	-2	2.10KΩ - 2.20KΩ
F	-3	3.09KΩ - 3.23KΩ
G	-4	7.89KΩ - 8.23KΩ
ALL	N/A	Resistance (PK to YEL) 1.96KΩ - 2.04KΩ

IQ Racer Hot Lamp Activation Temperature

The CDI will activate the gauge or dash mounted hot lamp whenever the engine coolant temperature is at least 221°F (105°C). The hot lamp is the only warning to alert the operator of an over-heating engine. The CDI will not limit RPM, initiate a mis-fire, or retard timing.

600 RR Hot Lamp Activation Temperature

The CDI will activate the gauge or dash mounted hot lamp as shown in the table.

2008 600 RR Hot Lamp

THROTTLE POSITION	RPM TEMPERATURE (°F / °C)			
	0	3000	5000	8000
0%	230 / 110			221 / 105
30%	221 / 105			
50%	199 / 93		208 / 98	
80%	199 / 93			

600 RR Hot Condition RPM Limit

The CDI will enter a RPM limit mode as shown in the table.

2008 600 RR Hot Condition

THROTTLE POSITION	RPM TEMPERATURE (°F / °C)			
	0	3000	5000	8000
0%	239 / 115	233 / 112		224 / 107
30%	230 / 110			
50%	208 / 98		215 / 102	
80%	208 / 98			

Dragon Fire Pipe Heater System

The Dragon Fire system allows the operator / racer to pre-heat the exhaust pipe and hold the engine at a RPM just below clutch engagement in order to generate the fastest hole shot with maximum engine horsepower.

The system is activated via a button on the left-hand handlebar. When pushed and held, the CDI will enter the Dragon Fire mode. The operator / racer then applies the throttle and holds the flipper at WOT. When the flag drops, the racer need only to release the Dragon Fire button.

The Dragon Fire system works by retarding the engine timing enough to accomplish two goals. The first goal is to heat the exhaust pipe's center section to approximately 750°F (400°C). The second goal is to hold engine RPM between 4500 and 5500 RPM.

NOTE: Always test stock and modified clutch setups to verify clutch engagement does not occur below 4500 - 5500 RPM.

Solenoid-Controlled Exhaust Valves

Each variable exhaust valve is controlled by a solenoid. Each solenoid controls the vent path for each valve assembly. The solenoids are normally closed when not powered by the CDI. When closed, cylinder pressure pushes up on each valve's bellows which opens the valve.

During engine operation, the CDI cuts power to each solenoid at 6700 RPM. Below 6700 RPM, both solenoids are powered allowing cylinder pressure to bypass each valve's bellows which keeps each exhaust valve in the down or closed position.

THROTTLE POSITION SENSOR (TPS)

The TPS is located on the carburetor rack (carbureted engines) or on the throttle body (CFI engines). The TPS is set at the time of manufacture and should only require adjustment when:

- When the TPS is replaced.
- When the carburetor rack or throttle body is replaced or adjusted.
- The TPS is suspected of being set incorrectly as part of troubleshooting.

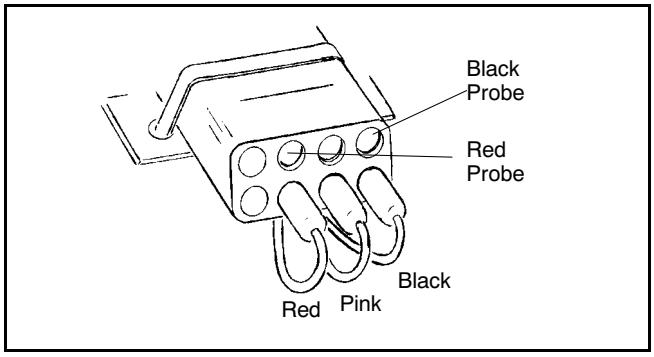
The TPS test tool, PN 2201519, is used to accurately adjust the TPS return signal settings.

TPS Test Tool Setup

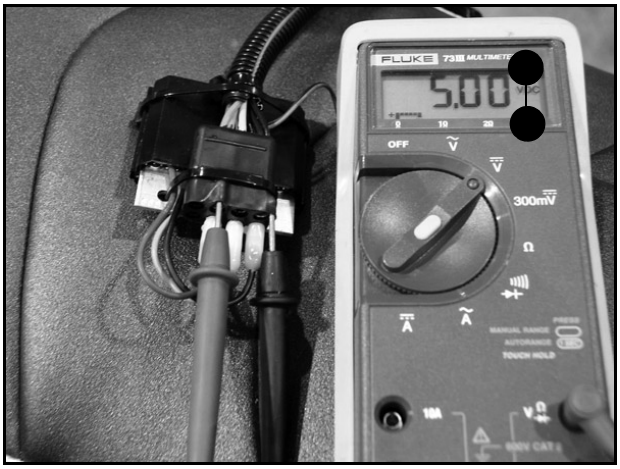
The test tool must be always be used to inspect the TPS on carbureted engines. On CFI models, either the test tool or Digital Wrench can be used to test the TPS.

NOTE: Signal readings can be affected if the 9 volt battery is weak. Always verify the battery is in good condition.

1. Set the multimeter to read Vdc.
2. Verify the 9 volt battery condition by inserting the black multimeter probe into the black wire terminal and the red multimeter probe into the pink wire terminal. Voltage should read 4.99 to 5.01 Vdc. Use a new battery if voltage is below 4.99 Vdc.



3. Connect the test tool to the TPS on the carburetor or throttle body.



NOTE: Always disconnect the 9 volt battery when tool is not in use.

Using the TPS Test Tool

1. Remove the wiring harness connector from the TPS.
2. Verify the throttle cable is not kinked and the throttle flipper is closed. Disconnect the throttle cable from the throttle flipper.
3. Connect the test tool to the TPS.
4. Insert the black multimeter probe into the black terminal port, then insert the red multimeter probe into the yellow terminal port.
5. Reference the specifications to determine if the TPS requires adjustment or replacement.
6. Reconnect the throttle cable with throttle flipper.

TPS Setting Specifications

ENGINES	VOLTAGE SETTINGS
Carbureted Engines	4.00 +/- 0.1 Vdc @ WOT

7. To verify the TPS is sending a linear signal, slowly move the throttle flipper from the closed to WOT position, then back down to the closed position.
8. The voltage readings displayed on the multimeter should rise and fall without erratically jumping from high to low.

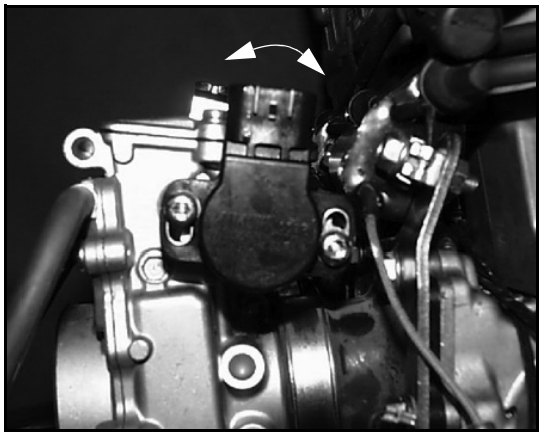
NOTE: The multimeter display may change scales and show O.L. momentarily when throttle flipper is moving.

9. If the signal readings are erratic, replace the TPS sensor.

TPS Adjustment - Carbureted Models

NOTE: Always verify the engine idle speed is set at engine operating temperature and the throttle cable freeplay is set to 0.10″ - 0.30″.

1. Connect the TPS test tool to the TPS.
2. Slightly loosen the screws securing the TPS to carburetor body.
3. Have an assistant hold the throttle flipper in the WOT position.
4. Turn the TPS **clockwise** to decrease voltage, or **counterclockwise** to increase voltage.
5. Carefully tighten the TPS screws when the WOT Vdc is 4.00Vdc.



SWITCHES

Brake Light

Switch	Lever Free	Lever Depressed
Yellow		X
Orange		X

Head Lights

Switch	Low Beam	High Beam
Yellow	X	X
Green	X	
YEL/RED		X

Handwarmer / Thumbwarmer Switch

Switch	Low Temp.	High Temp.
Yellow (AC Power)	X	X
Blue (Handwarmer)	X	
OR/GRY (Thumbwarmer)	X	
BLU/RED (Handwarmer)		X
W/PUR (Thumbwarmer		X

Dragon Fire Switch

Switch	Free	Depressed
WHT/BLK		X
Brown		X

Auxiliary On/Off Switch

Switch	Run	Off
Black		X
Brown		X

Tether Switch

Switch	Inserted	Removed
Black		X
Brown		X

Key Switch (600 RR Only)

Switch	OFF	RUN
Black	X	
Brown	X	

Oil Level Switch (600 RR Only)

Switch	Level Low	Level OK
Yellow	X	
Violet (Purple)	X	

Reverse Switch (600 RR Only)

Switch	Depressed	Free
Gray	X	
Brown	X	

2008 600 RR Regulator / Rectifier

The regulator rectifier on a 2008 600 RR limits AC Voltage to 14.3 volts. The module also supplies 12 Vdc to power the exhaust valve solenoid.

Replace the regulator / rectifier if the AC Voltage is above 14.8 V or when there is no 12 Vdc supply on the RED / GREEN circuit.

Circuit Specifications

PLUG / PIN / COLOR	FUNCTION
YELLOW	REGULATED 14.3 Vac POWER
RED/GREEN	EXHAUST VALVE SOLENOID POWER (Vdc)
BROWN	GROUND

DETONATION CONTROL (DET)

2008 600 RR Overview

Detonation control is achieved by using a knock sensor mounted to the cylinder head and an ECU (CFI engines) or the CDI (600HO engines).

The knock sensor "listens" for combustion knock by converting internal engine noise in to an electrical signal. The ECU or CDI uses the signal to determine the level of knock within the combustion chambers after each combustion event.

When the ECU or CDI determines detonation has occurred, the CHECK ENGINE / DET LED lamp will blink on and off at 0.5 second intervals.

On CFI models, the ECU will retard timing and provide additional fuel to eliminate the detonation. On carbureted engines, the CDI will retard timing until the detonation stops. If the detonation continues past a pre-determined level, the ECU or CDI will initiate an engine mis-fire mode.

To prevent detonation, follow these steps:

- Always use premium fuel (91, 92, or 93 octane)
- On carbureted engines, follow the carburetor jetting guidelines
- Do not modify the engine or exhaust system with non-approved Polaris modifications
- Verify there is no water or foreign material in the fuel
- Verify there is no internal engine damage
- Verify the cooling system is working properly

NOTE: Install the knock sensor fastener clean and dry without applying thread locker or oils.

VARIABLE EXHAUST SYSTEM (VES)

Overview

The Polaris VES system uses exhaust valves (1 per cylinder) to control the exhaust port height. The valves are actuated by controlling cylinder pressure with a solenoid, bellows, and a series of hoses.

At idle speed and up to a pre-determined level, the solenoid's ground path is closed by the CDI. This action opens the solenoid's internal valve and allows the cylinder pressure to vent into the atmosphere. During this time the valves are down.

To raise the valves, the CDI will cut the solenoid ground path which will close the vent path to atmosphere. The cylinder pressure will then act upon each valve bellows which will raise each valve.

On 600 RR engines, the CDI will turn the solenoid off at 6700 RPM when the throttle flipper is at least
3/4 throttle or at 7200 RPM when the throttle flipper is at least 1/2 throttle.

On IQ 600 Racer engines, the solenoid is off at any RPM whenever the throttle lever is below 100% open. When the throttle lever is at 100% (WOT), the solenoid remains powered until 7100 RPM.

NOTE: Solenoid Powered = Vent Path Open
Solenoid Off = Vent Path Closed

ELECTRONIC REVERSE (PERC)

Operation

⚠ WARNING

Reverse operation, even at low speeds, may cause loss of control, resulting in serious injury or death. To avoid loss of control, always:
LOOK BEHIND BEFORE AND WHILE BACKING.
AVOID SHARP TURNS.
SHIFT TO OR FROM REVERSE ONLY WHEN STOPPED.
APPLY THROTLE SLOWLY.

CAUTION

To avoid personal injury and/or engine damage, do not operate the electric start or recoil while engine is running.

1. Ensure that the vehicle is stopped and the engine is warmed up and running at idle.

NOTE: ***The system will only engage in reverse if the engine is below 4000 RPM. If engine is above 4000 RPM the system can not be activated.***

2. Ensure that the path behind you is clear.
3. Push and hold the yellow reverse button on the left hand control for 1 second and then release the button. The reverse light on the instrument panel will flash when engine is in reverse motion.

NOTE: ***The engine will automatically reduce RPM and it will reverse the rotation of the engine when the RPM is at the lowest RPM point.***

4. Ensure that the path behind you is clear.
5. Slowly apply throttle until the sled starts to move in reverse, and carefully direct the sled in the direction that you want.

NOTE: ***Maximum RPM in reverse is 6000 RPM.***

NOTE: If the engine stops running or is shut off while in reverse. The engine will start in forward gear.

Forward Operation

1. If unit was operated in reverse, ensure that the path ahead is clear, and push an hold the reverse button for 1 second and then release the button. The engine will now automatically change direction form reverse to forward and the reverse light on the instrument panel will stop flashing.

NOTE: ***When servicing clutches, ensure that the vehicle is in forward gear. If not damage to the driven clutch may occur when removing the belt.***

Altitude Setting

If your engine is carbureted, you can adjust the elevation setting of the Polaris electric reverse control (PERC). If your engine is a Cleanfire system, this is automatically done through the engine controller unit (ECU), and you do not need to do any setting.

At higher elevations over 6000 ft. (1829m), the engine requires a different ignition RPM setting to improve the operation of the reverse system.

To set the altitude settings:

1. With the engine running, push and hold the reverse button for 5 - 6 seconds and then release the button.
2. The reverse light will flash rapidly on the instrument panel.
3. You have now set the PERC system to the higher elevation setting.
4. To go back to the low elevation setting repeat step 1. The reverse light will flash slowly indicating that the system is now in the lower elevation setting.

NOTE: ***The elevation setting will be set in the memory (engine running or not) until it is changed.***

Important Notes

- Max RPM for shifting into reverse = 4000 RPM
- Max RPM for operating in reverse = 6000 RPM
- Engine must first reach 900 RPM at start up before the reverse system can be used. The system works between 900 and 4000 RPM.
- If the button is pushed above 4000 RPM the system is bypassed and nothing will happen.
- Flashing light on the instrument panel indicates that the system is in reverse. On carbureted units a slow flash indicates that the system is set for low elevation, and a fast flash indicates the system is set up for high elevation. Push and hold the reverse button for longer than 5 seconds to toggle back and forth from high and low elevation settings. On Cleanfire units this is automatically done through the engine controller unit (ECU).
- Elevation above 6000 ft. (1829m) requires a different timing curve to eliminate a “kick-back” effect.
- When servicing clutches, ensure that the vehicle is in the forward gear.

TROUBLESHOOTING TABLES

No Ignition (Spark)

Disconnect the single BLACK to BLK/WHT wire from the CDI Module to the ignition kill circuit. Does engine have spark?	YES→	Check the ignition switch, wire harness, throttle safety switches and kill switch for proper adjustment or short to ground. Repair or replace as necessary.
NO ↓		
Insert multimeter probes into the 2-pin (Red and Brown) ignition regulator/rectifier harness. Pull over engine. Is DC voltage present?	NO→	Replace ignition regulator/rectifier with a new part. Re-test. If DC voltage is still not present, test the stator charge coil (Blue and Green) circuits for AC voltage using a peak voltage reading adapter. Continue tests in left-side of table.
YES ↓		
Disconnect the stator to CDI module wires. Test the resistance values of the stator coils as per the wiring diagrams. Are the resistance values within specs?	YES→	If the parts of the ignition system under the flywheel check OK, the only remaining component is the coil/CDI module assembly. Replace the module with another with the same number.
NO ↓		
Isolate which component's resistance is not within specs. Remove the flywheel and stator. Recheck the resistances; look for pinched or bare harness wires; or replace the coil.		

Incorrect Timing

Follow the engine timing procedure for checking running timing at recommended RPM. Is the timing within limits?	NO→	Adjust the ignition timing by rotating the stator plate to correct the timing. After adjusting the recommended RPM timing, continue with operating RPM timing if poor performance exists. (Continue on with left column.)
YES ↓		
Remove the ignition kill circuit by disconnecting the single black wire between the CDI module and the machine harness. Is the timing now correct?	NO→	Check the ignition switch, throttle safety switches, kill switch and harness for damage which can cause intermittent shorting problems. Correct the problem.
YES ↓		
Verify the correct CDI module by comparing the code on the box to the information listed in the ignition data charts at the beginning of this section. Is it the right module?	NO→	Replace the module with the correct part and readjust the ignition timing.
YES ↓		
Check the resistance of the coils under the flywheel. Compare these to values on wiring diagram. Are they within limits?	NO→	Check the wiring connecting the coils and/or replace the coils as necessary.

NOTES

Numerics

2008 Publication Part Numbers 2.4
600 RR Fuel Tank Assembly 4.13
7.92 Chaincase Assembly View 7.5

B

Belt Burning Diagnosis 6.11
Belt Inspection 6.10
Belt Installation (TEAM driven clutch) 6.12
Belt Removal - Team Driven Clutch 6.12
Brake Caliper Assembly 7.13
Brake Caliper Replacement 7.13
Brake Disc Replacement 7.13
Brake Fluid Indicator 3.9
Brake Fluid Inspection 3.9
Brake Fluid Type 3.9
Brake Hose Replacement 7.13
Brake Lever Travel Inspection 3.9
Brake Pad Replacement 7.13
Brake System
- Bleeding 7.11
- Compensating Port 7.10
- Fluid Change 7.11
- Overview 7.10

C

Carburetor Synchronization 4.12
Chaincase
- Chains 7.4
- Gears 7.4

Chaincase Installation 7.6
Chaincase Oil Replacement 3.9
Chaincase Removal 7.6
Chassis Assembly
- Bulkhead and Tunnel 10.2
- Console 10.4
- Footrest Structure 10.3
- Hood 10.5
- Hood Mounting 10.6
- Nosepan and Side Panels 10.7
- Seat 10.4

Choke Lever Adjustment 3.10
Coolant Surge Tank Level 3.6
Cooling System
- IQ 600 Racer 5.28
- IQ 600 RR 5.27
- Thermostat Orientation 5.29

Cooling System Air Bleeding 3.6
Cooling System Bleeding 3.6
Crankcase Inspection
- Bearing fit 5.5

Crankshaft
- Runout Inspection 5.4
- Truing 5.8

Crankshaft Indexing 5.6
Crankshaft Inspection
- Checking Crankshaft Indexing 5.7
- Connecting Rod (small end) 5.6
- Connecting rod bearing 5.6
- Indexing 5.6
- Main bearing 5.5

Crankshaft Truing 5.8
Cylinder Honing 5.7
Cylinder Measurements 5.4

D

Detonation Control (DET) 11.9
Drive Belt Deflection Adjustment 3.5
Drive Belt Deflection Inspection 3.5
Drive Chain Tension Adjustment 3.9
Drive Clutch
- Assembly 6.17
- Disassembly 6.15
- Identification 6.14
- Removal 6.14
- Roller Installation 6.16
- Roller Removal 6.16
- Spider Indexing 6.18

Drive Clutch Weights 6.6
Drive System Terminology
- Backshifting 6.2
- Clutch Weight 6.2
- Drive Spring 6.2
- Driven Spring 6.2
- Engagement RPM 6.2
- Final Gearing 6.3
- Helix/Ramp 6.3
- Low/High Ratio Lines 6.3
- Neutral Speed 6.2
- Shift Out Overrev 6.2

Driven Clutch
- Removal 6.19

Driven clutch installation 6.19
Driveshaft and Jackshaft Assembly 7.8
Driveshaft Removal and Installation 7.9

E

Electric Reverse (PERC) 11.10
Electrical Specifications 11.2
Engine and Vehicle Break-In Procedure 2.2
Engine Component Assembles
- 600 RR / IQ Racer Water and Oil Pump 5.21
- 600 RR Crankcase 5.25
- 600 RR Cylinders / Cylinder Head 5.22
- 600 RR Pistons / Crankshaft 5.24
- 600 RR Recoil / Magneto 5.23
- IQ Racer Crankcase 5.20
- IQ Racer Cylinder Head / Cylinders 5.17
- IQ Racer Piston / Crankshaft 5.18
- IQ Racer Recoil / Magneto 5.19
- Variable Exhaust System (VES) 5.26

Engine Component Assemblies
- 600 RR Engine Mounting 5.15
- Engine Bulkhead 5.16
- IQ Racer Engine Mounting 5.14

Engine Data Formulas 2.5
Engine Inspections 5.4
- Cylinder Head 5.4

Engine Installation 5.12
Engine Removal 5.11
Engine Specifications
- Component Torque Sequences 5.2
- Detailed Specifications 5.3
- Fastener Torque Guide 5.2

Service Specifications 5.3
Engine Torque Stop Adjustment 3.6
Exhaust System 4.14
Exhaust Valve Cleaning 3.6

F

Filters
Oil and Fuel 3.7
Front Suspension
Alignment Bar Specifications 8.9
Assembly Illustration 8.4
Setup and Adjustments 8.9
Handlebar Centering 8.10
Rod End Engagement 8.9
Rod Ends 8.9
Toe Adjustment 8.10
Front Torque Arm Limiter Strap Adjustments 8.16
Fuel Filter 3.7
Fuel Pump Maintenance 4.9
Fuel Pump Overview 4.9
Fuel Systems
Service Warnings and Precautions 4.2

G

Gearing Charts 7.2
General Information
Racing Department Contacts 2.2
Racing Notes 2.1
General Reference 2.8
Decimal Equivalents 2.9
Fuel / Oil Premix Ratios 2.8
Gasoline Volatility 2.8
Measurement Conversion Chart 2.10
Metric Tap Drill Sizes 2.9
SAE Tap Drill Sizes 2.9
Service Precautions 2.11
Standard Bolt Torque Specification 2.8

H

Handlebar Assembly 8.8
Handlebar Torque Adjustment 3.11
Honing Procedure 5.8
Cleaning the cylinder after honing 5.8

I

Idle Speed Gap / Throttle Lever Free Play Adjustment 3.10
IFS Springs 8.2
Ignition Timing 11.4
IQ 600 Racer Fuel Tank Assembly 4.13
IQ 600 RR Steering Assembly 8.7
IQ Racer Steering Assembly 8.6

J

Jackshaft Installation 7.9
Jackshaft Removal 7.9
Jetting Guidelines 4.6

L

Light Bulb Replacement 3.14
Lower Spherical Bearing Replacement 8.10
Lubrication
Chaincase Oil 3.8
Choke Cable 3.8
Front Suspension 3.8
Rear Suspension 3.8
Throttle Cable 3.8

M

Maintenance Products 3.4
Master Cylinder / Lever Service 7.12
Mikuni (Long) Pilot Air Jets 4.4
Mikuni (Short) Pilot Air Jets 4.4
Mikuni Carburetor Components
Float System 4.5
Fuel Delivery 4.5
Fuel Metering 4.5
Function 4.5
Jet Needle 4.7
Main Jet 4.6
Needle Jet 4.7
Pilot Air Screw 4.6
Pilot Jet 4.6
Piston Valve or Throttle Valve 4.6
Mikuni Jet Needles 4.4
Mikuni Main Jets 4.3
Mikuni Notched Piston Valves 4.4
Mikuni Pilot Jets 4.3
Mikuni Piston or Throttle Valve Part Numbers 4.4
Mikuni Starter Jets 4.3
Mikuni TM38 / 40 Flat Slide Service
Disassembly 4.10
Mikuni TM38 Flat Slide Service
Assembly 4.11
Model Number Designation 2.3
Model Specifications
2008 600 IQ Racer 1.4
2008 600 RR 1.2

O

Off-Season Storage Procedures 3.14
Oil Filter 3.7
Oil Pump
Bleeding 3.7
Oil Pump Adjustment
600 RR 3.7
Overview
2008 600 IQ Racer 2.2
2008 600 RR 2.2

P

Periodic Maintenance Table 3.2
Piston Inspection 5.5
Piston Ring Installed Gap 5.5
Piston Wash Reading 2.10
PVT System
Adjusting Belt Deflection 6.12
Drive Belts 6.10
Drive Clutch Springs 6.5
Non-ER LW Driven Helixes 6.7, 6.8
Special Tools 6.4
Team Driven Springs 6.9
PVT System Overview 6.2

R

Rail Sliders 8.16
Rear Suspension Adjustment Procedure 8.15

Rear Suspension Assemblies
Front and Rear Torque Arms 8.13
Pivots and Rear Idler 8.11
Rail Assembly 8.12
Rear Suspension Coupling 8.14
Rear Suspension Installation 8.17
Rear Suspension Operation 8.14
Rear Suspension Removal 8.17
Rear Suspension Ride Height 8.15
Rear Suspension Special Tools 9.2
Rear Suspension Weight Transfer 8.14
Rear Track Shock Pivot Orientation 8.3
Recoil Pulley Disassembly and Assembly 5.10
Recommended Engine Coolant 3.6
RMK FTA set up recommendations 8.16

S

Scissor Stop Adjustments 8.15
Shock Maintenance 9.8
Shock Piston Orientation 9.5
Shock Specifications 9.6
Shock Valve Part Numbers
Walker Evans 9.3
Walker Evans - 7/16 ID 9.4
Shock Valve Stack Configurations 9.7
Shock Valving Arrangement 9.5
Ski / Skag Torque Adjustments 3.12
Ski Assembly 8.3
Spark Plug Reading 2.10
Spindle Assembly 8.10
Spindle Disassembly 8.10
Steering Post Assembly 8.5
Steering Inspection 8.2
Suspension Mounting Fastener Torque 8.3
Switches 11.8

T

Thermostat 5.29
Throttle Opening vs. Fuel Flow 4.7
Throttle Position Sensor 11.6
Toe Specifications 8.2
Torque Conversion Table 2.7
Torsion Spring Adjustments 8.16
Track Alignment 3.13
Track Alignment Adjustment 3.13
Track Tension Adjustment 3.12
Trouble Shooting
Electrical 11.11

U

Upper/Lower Control Arm Installation 8.10
Upper/Lower Control Arm Removal 8.10

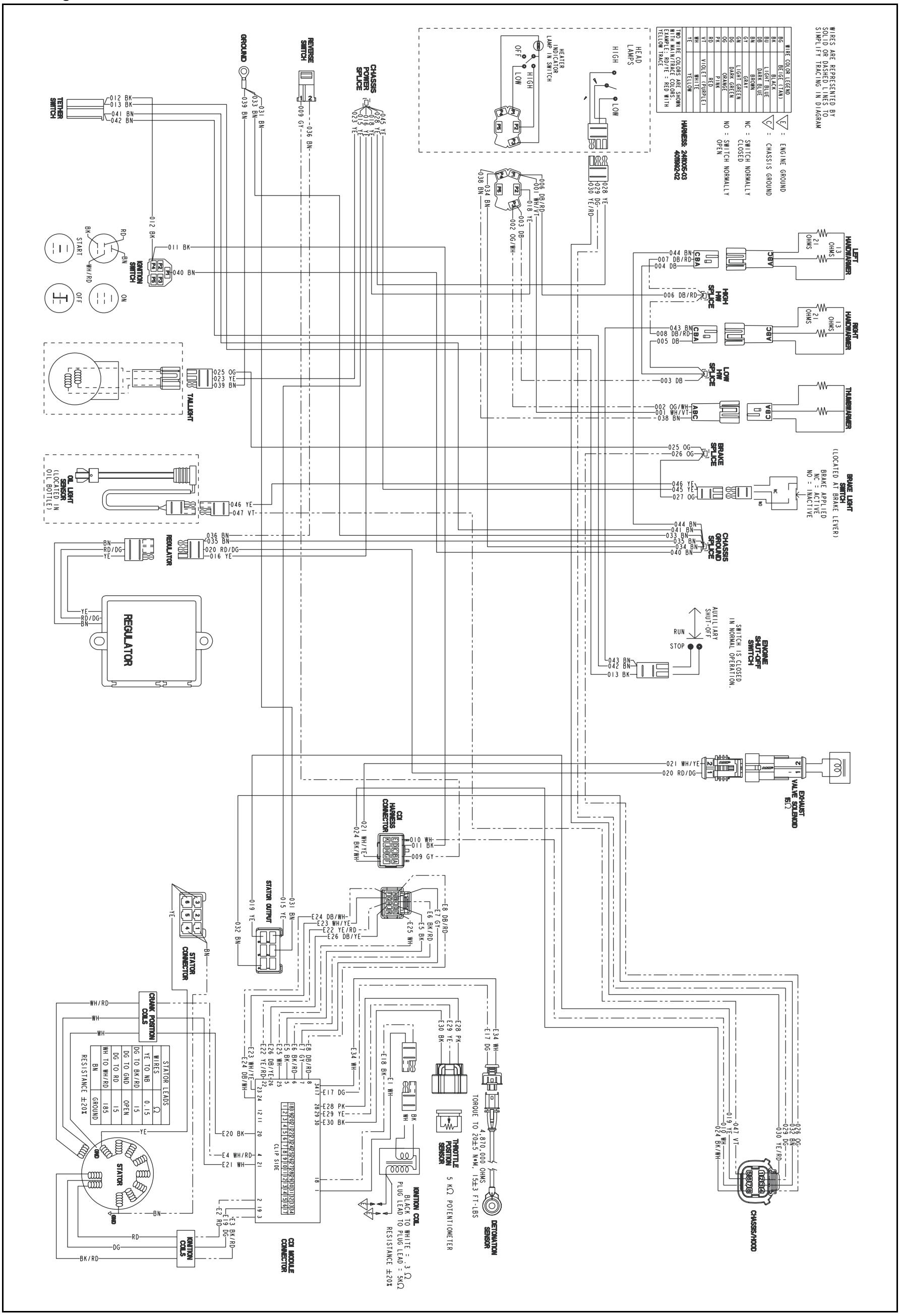
V

Variable Exhaust Systems (VES) 11.9
Vehicle Identification Number (VIN) 2.4
VIN 2.4

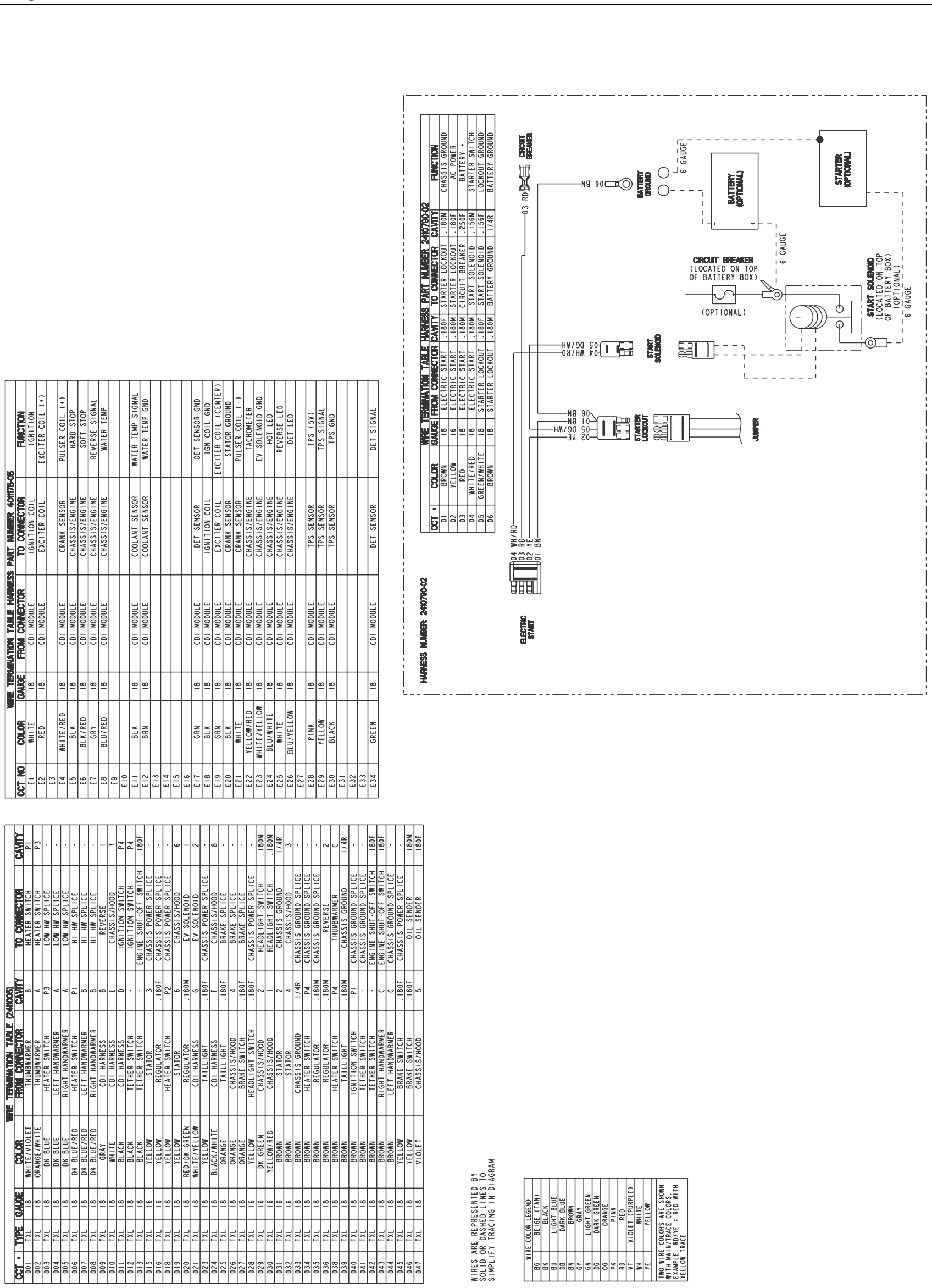
W

Walker Evans Air Shock Maintenance 9.9
Walker Evans Remote Reservoir Shock Maintenance . 9.10
Wiring Diagram
2008 IQ 600 Racer 12.4
2008 IQ 600 RR Chassis 1 of 2 12.1
2008 IQ 600 RR Chassis 2 of 2 12.2
2008 IQ 600 RR Hood 12.3

2008 IQ 600 RR Chassis Harness 1 of 2



2008 IQ 600 RR Chassis Harness 2 of 2



CCT *	COLOR	GAUGE	FROM CONNECTOR	TO CONNECTOR	CAVITY	FUNCTION
01	BROWN	18	ELECTRIC START	STARTER LOCKOUT	.180M	CHASSIS GROUND
02	YELLOW	16	ELECTRIC START	STARTER LOCKOUT	.180F	AC POWER
03	RED	18	ELECTRIC START	CIRCUIT BREAKER	.250F	BATTERY +
04	WHITE/RED	18	ELECTRIC START	START SOLENOID	.156M	STARTER SWITCH
05	GREEN/WHITE	18	STARTER LOCKOUT	START SOLENOID	.156F	LOCKOUT GROUND
06	BROWN	18	STARTER LOCKOUT	BATTERY GROUND	1/4R	BATTERY GROUND

CCT NO	COLOR	GAUGE	FROM CONNECTOR	TO CONNECTOR	FUNCTION
E1	WHITE	18	CDI MODULE	IGNITION COIL	IGNITION
E2	RED	18	CDI MODULE	EXCITER COIL	EXCITER COIL (+)
E3					
E4	WHITE/RED	18	CDI MODULE	CRANK SENSOR	PULSER COIL (+)
E5	BLK	18	CDI MODULE	CHASSIS/ENGINE	HARD STOP
E6	BLK/RED	18	CDI MODULE	CHASSIS/ENGINE	SOFT STOP
E7	GRY	18	CDI MODULE	CHASSIS/ENGINE	REVERSE SIGNAL
E8	BLU/RED	18	CDI MODULE	CHASSIS/ENGINE	WATER TEMP
E9					
E10					
E11	BLK	18	CDI MODULE	COOLANT SENSOR	WATER TEMP SIGNAL
E12	BRN	18	CDI MODULE	COOLANT SENSOR	WATER TEMP GND
E13					
E14					
E15					
E16					
E17	GRN	18	CDI MODULE	DET SENSOR	DET SENSOR GND
E18	BLK	18	CDI MODULE	IGNITION COIL	IGN COIL GND
E19	GRN	18	CDI MODULE	EXCITER COIL	EXCITER COIL (CENTER)
E20	BLK	18	CDI MODULE	CRANK SENSOR	STATOR GROUND
E21	WHITE	18	CDI MODULE	CRANK SENSOR	PULSER COIL (-)
E22	YELLOW/RED	18	CDI MODULE	CHASSIS/ENGINE	TACHOMETER
E23	WHITE/YELLOW	18	CDI MODULE	CHASSIS/ENGINE	EV SOLENOID GND
E24	BLU/WHITE	18	CDI MODULE	CHASSIS/ENGINE	HOT LED
E25	WHITE	18	CDI MODULE	CHASSIS/ENGINE	REVERSE LED
E26	BLU/YELLOW	18	CDI MODULE	CHASSIS/ENGINE	DET LED
E27					
E28	PINK	18	CDI MODULE	TPS SENSOR	TPS (5V)
E29	YELLOW	18	CDI MODULE	TPS SENSOR	TPS SIGNAL
E30	BLACK	18	CDI MODULE	TPS SENSOR	TPS GND
E31					
E32					
E33					
E34	GREEN	18	CDI MODULE	DET SENSOR	DET SIGNAL

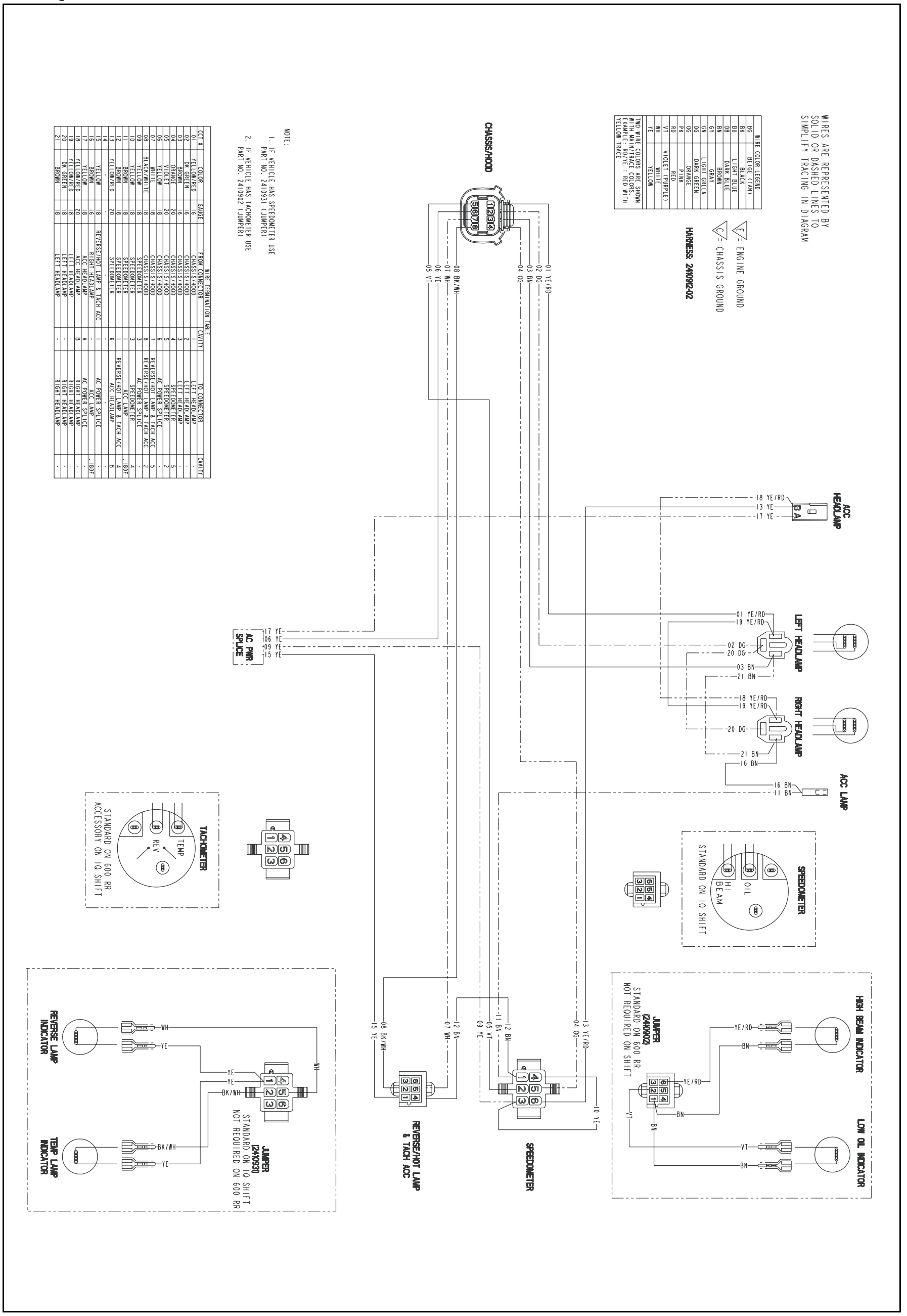
CCT *	TYPE	GAUGE	COLOR	FROM CONNECTOR	CAVITY
001	TXL	18	WHITE/VIOLET	THUMBWARMER	P1
002	TXL	18	ORANGE/WHITE	THUMBWARMER	A
003	TXL	18	DK BLUE	HEATER SWITCH	P3
004	TXL	18	DK BLUE	LEFT HANDWARMER	A
005	TXL	18	DK BLUE	RIGHT HANDWARMER	P1
006	TXL	18	DK BLUE/RED	HEATER SWITCH	A
007	TXL	18	DK BLUE/RED	LEFT HANDWARMER	B
008	TXL	18	DK BLUE/RED	RIGHT HANDWARMER	B
009	TXL	18	GRAY	CDI HARNESS	B
010	TXL	18	WHITE	CDI HARNESS	E
011	TXL	18	BLACK	CDI HARNESS	D
012	TXL	18	BLACK	TETHER SWITCH	-
013	TXL	18	BLACK	TETHER SWITCH	-
015	TXL	16	YELLOW	STATOR	3
016	TXL	16	YELLOW	REGULATOR	.180F
018	TXL	18	YELLOW	HEATER SWITCH	P2
019	TXL	18	YELLOW	STATOR	6
020	TXL	18	RED/DK GREEN	REGULATOR	.180M
021	TXL	18	WHITE/YELLOW	CDI HARNESS	G
023	TXL	18	YELLOW	TAILLIGHT	.180F
024	TXL	18	BLACK/WHITE	CDI HARNESS	F
025	TXL	18	ORANGE	TAILLIGHT	.180F
026	TXL	18	ORANGE	BRAKE SWITCH	4
027	TXL	18	ORANGE	BRAKE SWITCH	.180F
028	TXL	16	YELLOW	HEADLIGHT SWITCH	.180F
029	TXL	16	DK GREEN	CHASSIS/HOOD	2
030	TXL	16	YELLOW/RED	CHASSIS/HOOD	1
031	TXL	16	BROWN	STATOR	4
032	TXL	16	BROWN	STATOR	3
033	TXL	18	BROWN	CHASSIS GROUND	1/4R
034	TXL	18	BROWN	HEATER SWITCH	P4
035	TXL	18	BROWN	REGULATOR	.180M
036	TXL	18	BROWN	REGULATOR	2
038	TXL	18	BROWN	HEATER SWITCH	P4
039	TXL	18	BROWN	TAILLIGHT	.180M
040	TXL	18	BROWN	IGNITION SWITCH	1/4R
041	TXL	18	BROWN	TETHER SWITCH	-
042	TXL	18	BROWN	TETHER SWITCH	-
043	TXL	18	BROWN	RIGHT HANDWARMER	C
044	TXL	18	BROWN	LEFT HANDWARMER	.180F
045	TXL	18	YELLOW	BRAKE SWITCH	.180F
046	TXL	18	YELLOW	BRAKE SWITCH	.180M
047	TXL	18	VIOLET	CHASSIS/HOOD	.180F

WIRE COLOR LEGEND	
BG	BEIGE (TAN)
BK	BLACK
BU	LIGHT BLUE
DB	DARK BLUE
BN	BROWN
GY	GRAY
GN	LIGHT GREEN
DG	DARK GREEN
OG	ORANGE
PK	PINK
RD	RED
VT	VIOLET (PURPLE)
WH	WHITE
YE	YELLOW

TWO WIRE COLORS ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: RD/YE = RED WITH YELLOW TRACE

WINNING PERFORMANCE
POLARIS

2008 IQ 600 RR Hood Harness



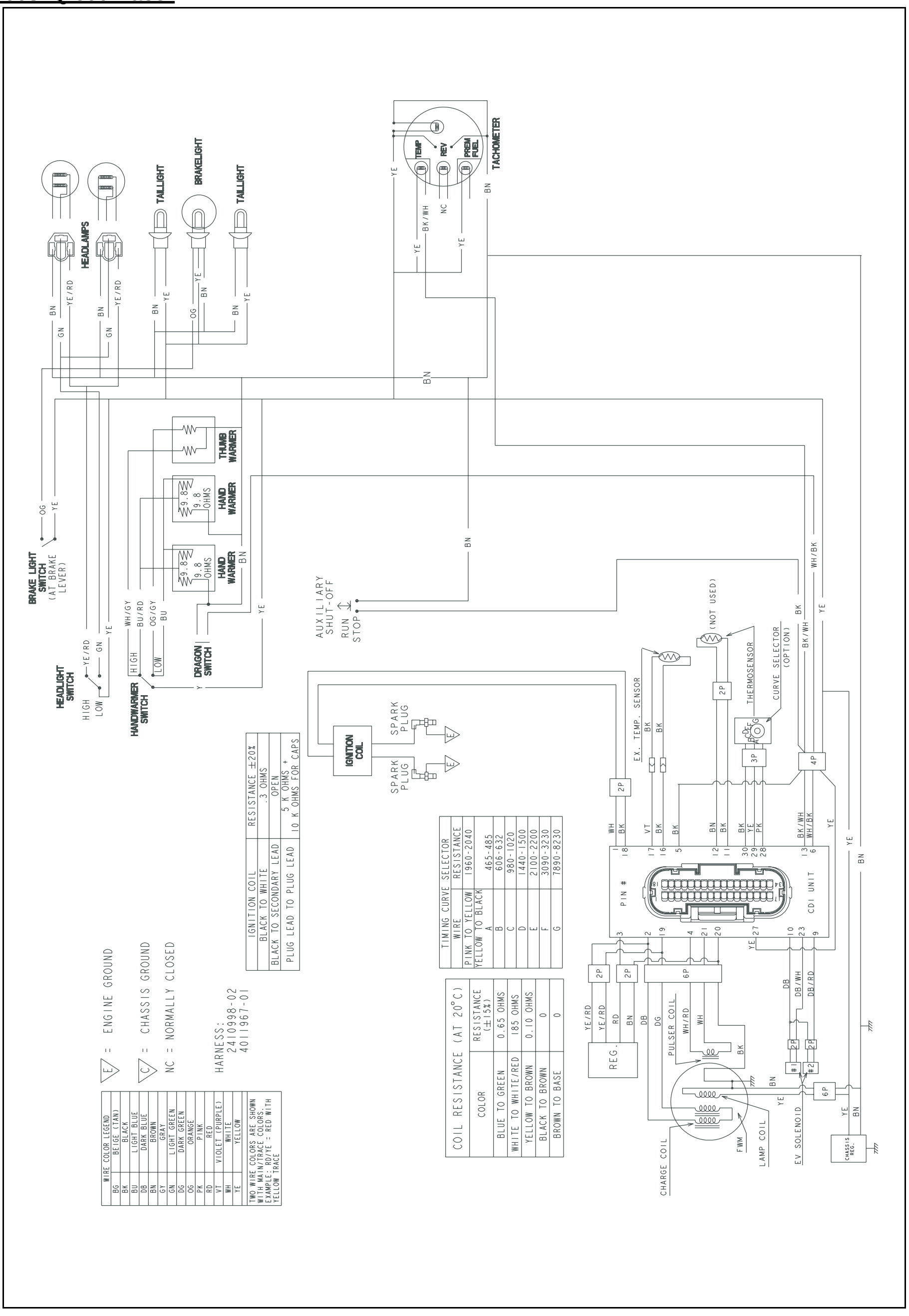
NOTE:

1. IF VEHICLE HAS SPEEDOMETER USE PART NO. 2410931 (JUMPER)
2. IF VEHICLE HAS TACHOMETER USE PART NO. 2410902 (JUMPER)

WIRE TERMINATION TABLE

CCT #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY
01	YELLOW/RED	16	CHASSIS/HOOD	1	LEFT HEADLAMP	A
02	DK BROWN	16	CHASSIS/HOOD	2	LEFT HEADLAMP	B
03	BROWN	16	CHASSIS/HOOD	3	LEFT HEADLAMP	C
04	ORANGE	20	CHASSIS/HOOD	4	SPEEDOMETER	3
05	VIOLET	20	CHASSIS/HOOD	5	SPEEDOMETER	2
06	YELLOW	18	CHASSIS/HOOD	6	AC POWER SPLICE	-
07	WHITE	18	CHASSIS/HOOD	7	REVERSE/HOT LAMP & TACH ACC	5
08	BLACK/WHITE	18	CHASSIS/HOOD	8	REVERSE/HOT LAMP & TACH ACC	2
09	YELLOW	18	SPEEDOMETER	3	AC POWER SPLICE	-
10	YELLOW	18	SPEEDOMETER	3	SPEEDOMETER	4
11	BROWN	18	SPEEDOMETER	1	ACC LAMP	.180F
12	BROWN	18	SPEEDOMETER	1	REVERSE/HOT LAMP & TACH ACC	4
13	YELLOW/RED	20	SPEEDOMETER	6	ACC HEADLAMP	B
14	-	-	-	-	-	-
15	YELLOW	18	REVERSE/HOT LAMP & TACH ACC	1	AC POWER SPLICE	-
16	BROWN	16	RIGHT HEADLAMP	-	ACC LAMP	.180F
17	YELLOW	18	ACC HEADLAMP	A	AC POWER SPLICE	-
18	YELLOW/RED	20	ACC HEADLAMP	B	RIGHT HEADLAMP	-
19	YELLOW/RED	18	LEFT HEADLAMP	-	RIGHT HEADLAMP	-
20	DK GREEN	18	LEFT HEADLAMP	-	RIGHT HEADLAMP	-
21	BROWN	18	LEFT HEADLAMP	-	RIGHT HEADLAMP	-

2008 IQ 600 Racer



WINNING PERFORMANCE
POLARIS